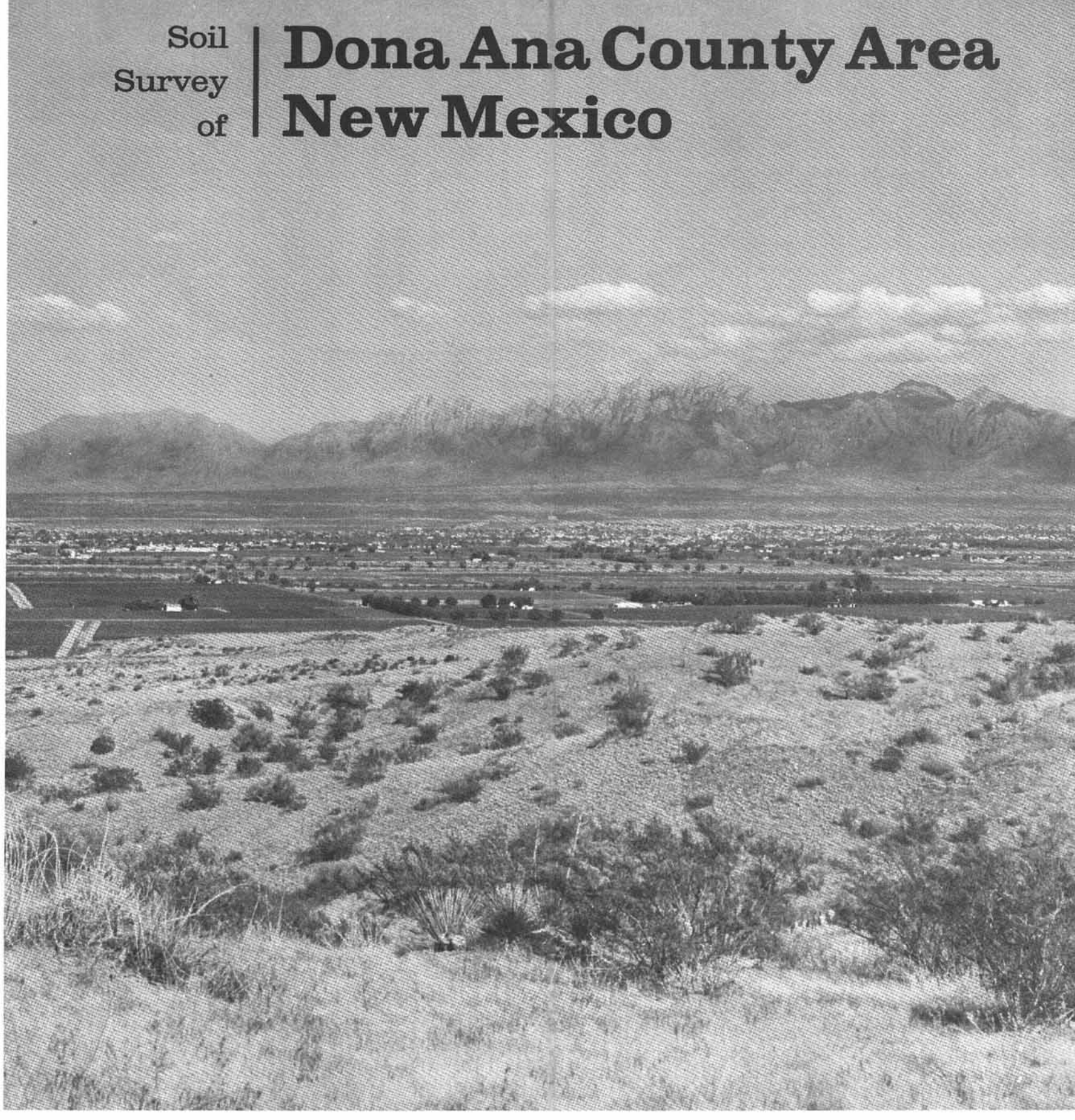
Soil Survey of

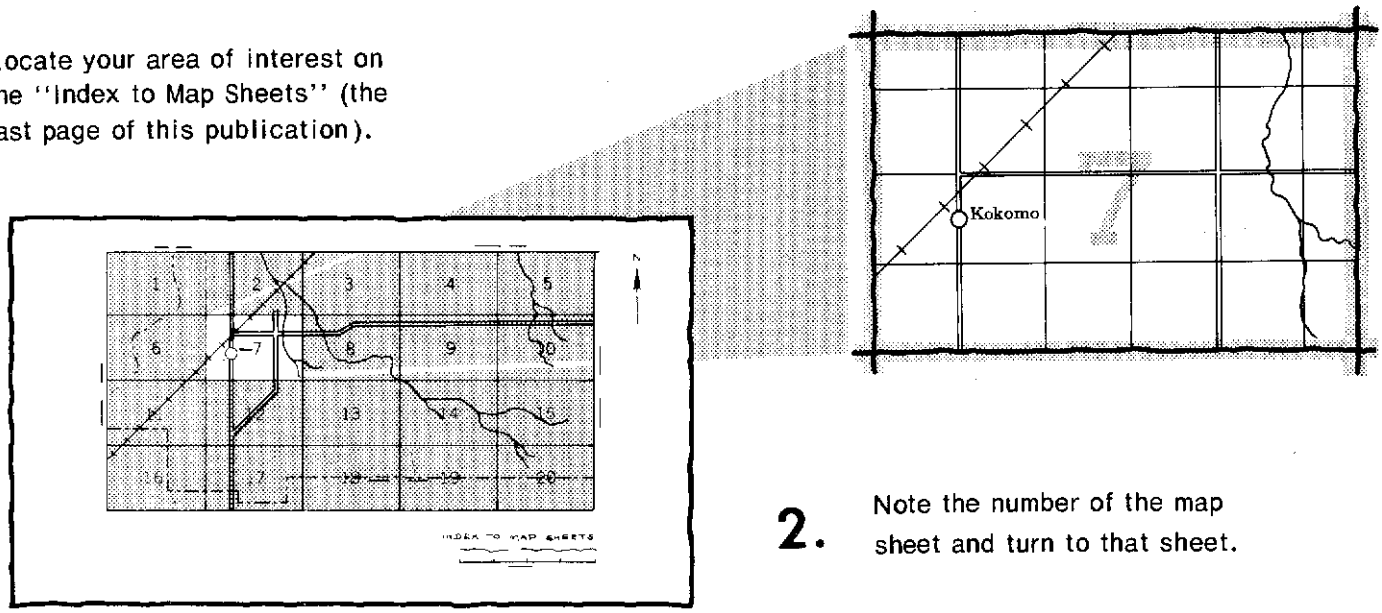
Dona Ana County Area New Mexico



United States Department of Agriculture, Soil Conservation Service
in cooperation with
United States Department of the Interior, Bureau of Land Management
New Mexico Agricultural Experiment Station

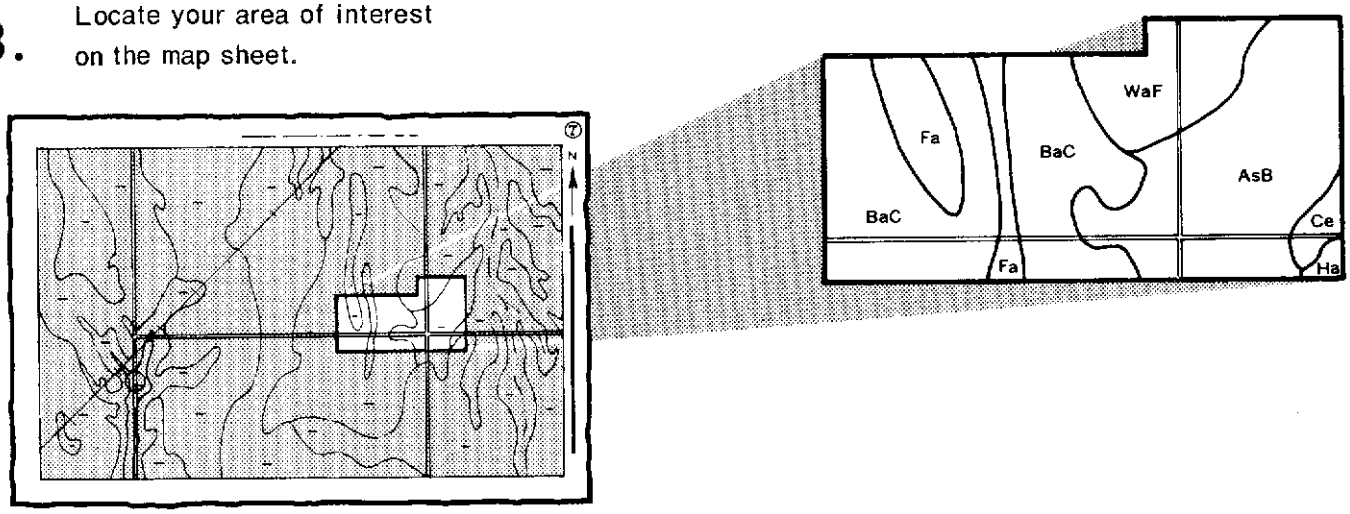
HOW TO USE

1. Locate your area of interest on the "Index to Map Sheets" (the last page of this publication).

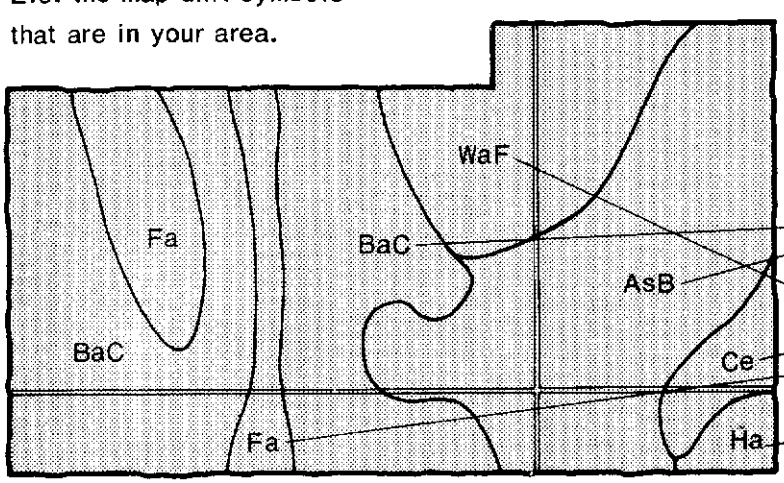


2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.



4. List the map unit symbols that are in your area.



Symbols

AsB
BaC
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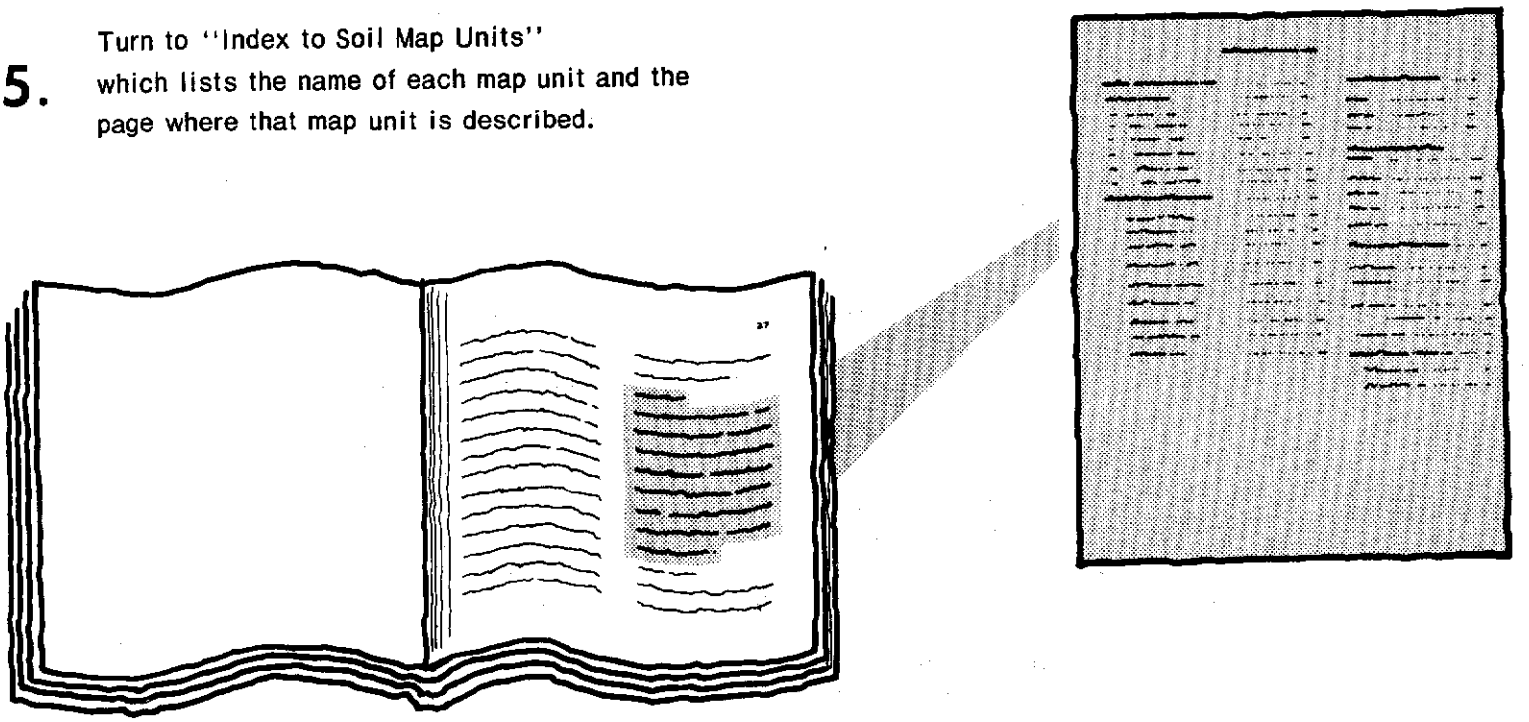
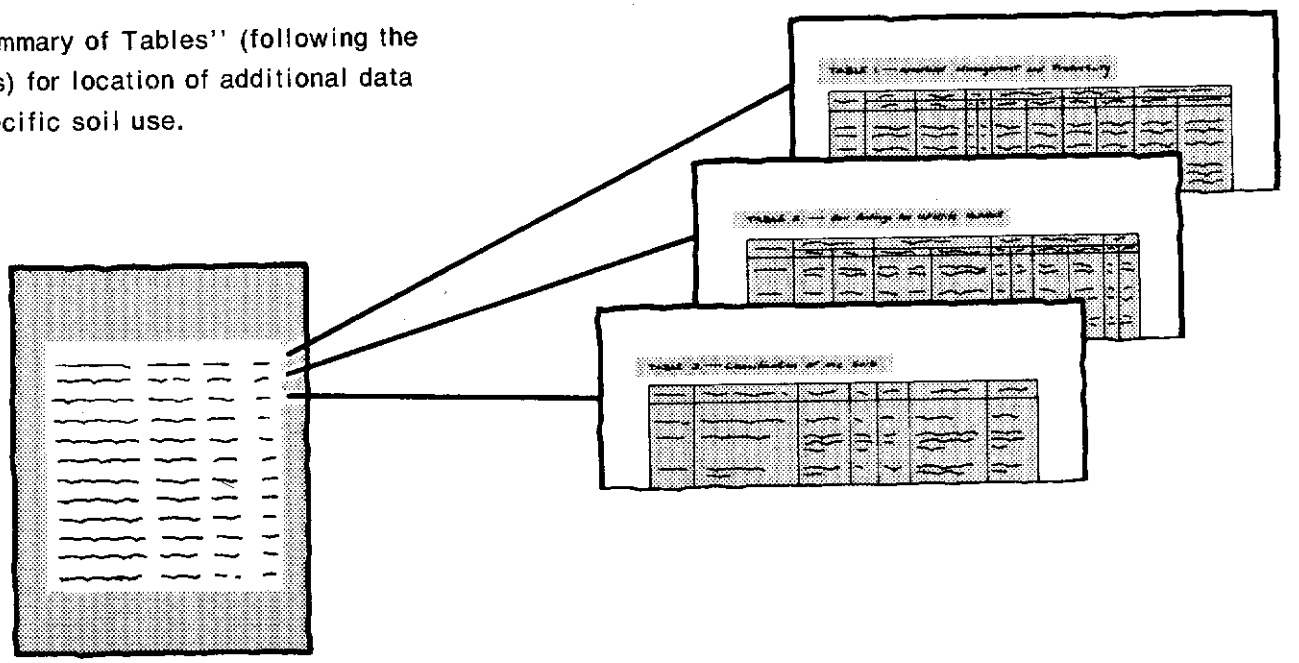
THIS SOIL SURVEY

5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.



6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; to specialists in wildlife management, waste disposal, or pollution control.

This is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and agencies of the States, usually the Agricultural Experiment Stations. In some surveys, other Federal and local agencies also contribute. The Soil Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was done in the period 1961-75. Soil names and descriptions were approved in 1977. Unless otherwise indicated, statements in the publication refer to conditions in the survey area in 1975. This survey was made cooperatively by the Soil Conservation Service, the U.S. Department of the Interior, Bureau of Land Management, and the New Mexico Agricultural Experiment Station. It is part of the technical assistance furnished to the La Union and Caballo Natural Resource Conservation Districts.

Soil maps in this survey may be copied without permission, but any enlargement of these maps can cause misunderstanding of the detail of mapping and result in erroneous interpretations. Enlarged maps do not show small areas of contrasting soils that could have been shown at a larger mapping scale.

Cover: The major urban areas and most of the irrigated cropland in the survey area are in the Rio Grande Valley. The Organ Mountains are in the background of this view of the Valley.

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Foreword

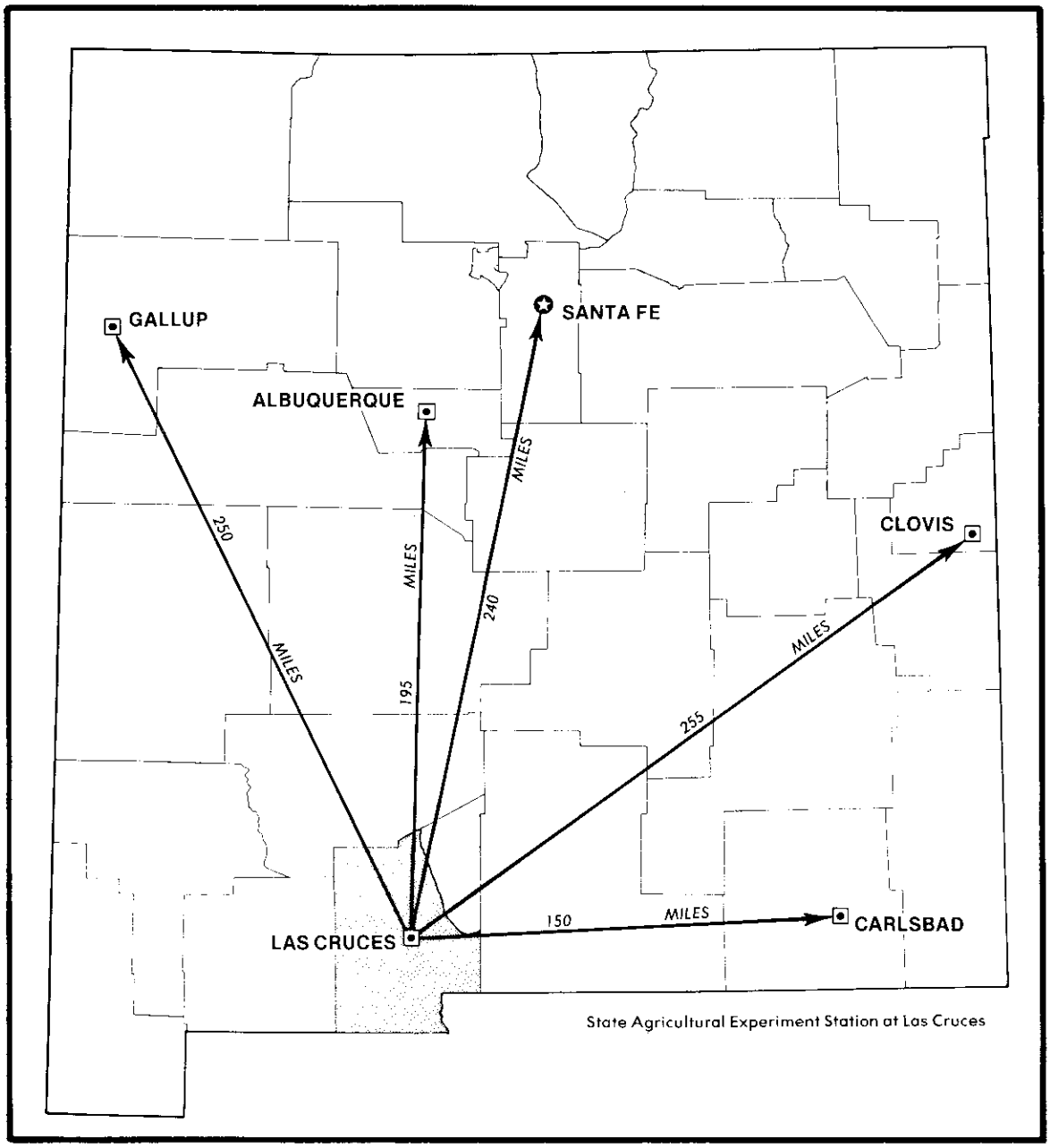
This soil survey contains much information useful in land-planning programs in the Dona Ana County Area. Of prime importance are the predictions of soil behavior for selected land uses. Also highlighted are limitations or hazards to land uses that are inherent in the soil, improvements needed to overcome these limitations, and the impact that selected land uses will have on the environment.

This soil survey has been prepared for many different users. Farmers, ranchers, and agronomists can use it to determine the potential of the soil and the management practices required for food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use it to plan land use, select sites for construction, develop soil resources, or identify any special practices that may be needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the soil survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur even within short distances. Soils may be seasonally wet or subject to flooding. They may be shallow to bedrock. They may be too unstable to be used as a foundation for buildings or roads. Very clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map; the location of each kind of soil is shown on detailed soil maps. Each kind of soil in the survey area is described, and much information is given about each soil for specific uses. Additional information or assistance in using this publication can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

A. W. Hamelstrom
State Conservationist
Soil Conservation Service



Location of Dona Ana County Area in New Mexico.

Soil Survey of | Dona Ana County Area New Mexico

By H. Edward Bulloch, Jr. and Raymond E. Neher, Soil Conservation Service

Surveyed by H. Edward Bulloch, Jr., Clement L. Chastain, Archie J. Roath, Kathleen B. Sisson, Raymond E. Neher, Joe Salinas, Douglas S. Pease, William A. Buchanan, and Raymond D. Taylor, Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service, in cooperation with United States Department of the Interior, Bureau of Land Management, and New Mexico Agricultural Experiment Station

DONA ANA COUNTY AREA is in south-central New Mexico, bordering on El Paso County, Texas, and the State of Chihuahua, Mexico. This survey area takes in 1,979,190 acres and includes all of Dona Ana County except the northeastern corner.

Lying wholly within the Basin and Range Province, the survey area is characterized by gently sloping plains broken by rugged mountain ranges and the Rio Grande Valley. The mountain ranges are generally aligned in a north-south direction. The San Andres, San Augustin, Organ, and Franklin Mountains form a range near the eastern boundary of the survey area. The Sierra de las Uvas and West Potrillo Mountains cover much of the northwestern and southwestern parts of the survey area. Comparatively less extensive are the East Potrillo Mountains, in the southwestern part of the survey area; the Dona Ana Mountains, north of Las Cruces; and the Robledo Mountains, northwest of Las Cruces.

Mountain upland areas are commonly steep to extremely steep. In most of these areas, the elevation is between 4,800 and 6,500 feet; but on a number of individual peaks, it exceeds 7,000 feet. The summit of Organ Needle, at 9,012 feet, is the highest point in the survey area.

The elevation in other parts of the survey area ranges from 3,730 feet in the Rio Grande Valley to about 5,000 feet on the upland plains. The Rio Grande Valley is nearly level to very gently sloping and varies in width from less than 1 mile to as much as 5 miles. The adjacent plains, in several broad intermontane basins, are as yet unaffected by the Rio Grande Valley incision.

The Rio Grande drains the areas immediately adjacent to it. Closed basins or playas drain the rest of the survey area. The Jornada del Muerto, the Tularosa, the Mesilla, and the Mimbres basins are the largest. The Jornada del Muerto basin is an extensive area north of Las Cruces between the Caballo and Dona Ana Mountains to the west and San Andres and San Augustin Mountains to the east. The Tularosa basin is east of the San Andres, San Augustin, and Organ Mountains. The Mesilla and Mimbres basins, both in the southwestern part of the survey area, are separated by the West Potrillo Mountains. A small area in the extreme southeastern part of the survey area drains into the Hueco basin. More detailed information on geology, geomorphology, and hydrology is available from other sources (*14, 17, 18*).

General nature of the survey area

This section gives general information about the survey area. It discusses climate, history, and development.

Climate

Prepared by Frank E. Houghton, National Weather Service, Office for State Climatology, Las Cruces, New Mexico.

This survey area is arid, except for small semiarid areas at higher elevations where precipitation is greater and temperatures cooler. Fall, winter, and spring are the dry seasons because much of the moisture in the eastward circulation from the Pacific Ocean is removed as the air passes over the mountains west of New Mexico. Summer is the rainy season. Moisture-laden air from the Gulf of Mexico enters southern New Mexico; strong surface heating and the upslope flow of the air cause brief, and often heavy, showers. South-central New Mexico mountains have a shielding effect on the southeasterly air flow, and the amount of precipitation received west of these mountains along the Rio Grande Valley is less, especially in spring.

The pattern of precipitation for the survey area is shown in Table 1. The average annual precipitation ranges from 7 to 9 inches throughout most of the county, but the highest elevations receive as much as 16 inches. Annual totals as low as 3 inches and as high as 19.6 inches have been recorded. Monthly totals range from 0 to 7.5 inches. In a 24-hour period, 6.5 inches of rain fell during an intense storm at New Mexico State

University. On the average, 42 thunderstorms occur each year, most of them in April through October; a few are accompanied by hail. Dust storms are most frequent in spring when winds are strong and soils are dry, but soil blowing can occur briefly just before a thunderstorm.

Snowfall is generally light at lower elevations and occurs infrequently during the period November through March. Average annual snowfall ranges from 2.5 to 5 inches at lower elevations, but as much as 9 inches has fallen in a 24-hour period. In about 1 year in 3 there is no measurable snowfall. At New Mexico State University, an average of less than 1 day in winter has 1 inch or more of snow. The average depth of snow cover on these days is 2 inches, but rarely does the snow cover last for 2 consecutive days.

Temperature patterns are also shown in Table 1. In the mountains, there is an average decrease of 3 degrees in temperature for an increase of 1,000 feet in elevation. Recorded extremes in temperature are 114 degrees at Hatch, and 20 degrees below zero at Jornada Experimental Range. The highest temperatures usually occur when hot air from the mountains of Mexico descends into the Rio Grande Valley. The coldest temperatures are usually brought by extremely old intrusions of Canadian and Arctic air. The range in daily temperatures is characteristically large in continental areas. In the survey area the difference between the low and the high temperature is about 33 degrees. Freeze dates in spring and fall are given in Table 2, and these dates are generally representative of the lower elevations in the survey area.

Miscellaneous weather elements and their patterns throughout the year are given in Table 3. Low humidity and plentiful sunshine are characteristic of continental climates.

History and development

Bones of prehistoric man, along with those of dive wolf, camel, sloth, and extinct species of horses and other animals, have been found in a cavern at Bishop Gap *(4)*. Indian remains from the Pueblo period also have been found in the survey area, but there is no evidence of permanent settlement in that period. A semisedentary tribe lived in the area of El Paso at the time of the Spanish expeditions; apparently, most of the area was inhabited by roving bands of Comanches and Apaches.

The Rio Grande served as a route for Spanish travelers. The passage of Fray Agustin Rodriquez, a Franciscan missionary, through the area in 1581 was the earliest recorded. He was followed 2 years later by Antonio de Espejo. Juan de Onate also passed through the area. He founded El Paso del Norte (now Ciudad Juarez) before moving to Tonuco and then across the Jornado del Muerto. A presidio was established at Robledo, and in 1680 settlements were established in the valley area to the south, now a part of Texas.

A number of colonies were established along the river south of Robledo by immigrants from Mexico after the overthrow of Spanish power in 1812. A number of land grants were made about that time, including the Dona Ana Bend Grant, the Santo Tomas de Yturbide Grant, and the Brazito Grant.

In 1848, General Kearney took possession of New Mexico for the United States.

In 1849, Captain R. B. Marcy led an expedition from San Antonio to Santa Fe *(20)*. On the return trip, he crossed the Jornada del Muerto to Dona Ana, then eastward by way of the San Agustin Pass and the Tularosa Basin. Marcy's report describes the town of Dona Ana as a settlement of "300 inhabitants, principally Mexicans, who . . . depend for subsistence almost entirely on the cultivation of the soil. They are obliged here . . . to irrigate." The town of Las Cruces was in existence at this time. An old road across the Jornada del Muerto, branching off at Rincon and crossing to Deming, later became part of the Santa Fe Trail.

Dona Ana County was made a division of the Territory of New Mexico in 1851. The boundaries of the county extended from the eastern edge of the Territory west to the Colorado River. The county was named for the town of Dona Ana, which received its name from Colonel Ana's daughter, who had been captured by Apache Indians *(3)*.

In 1851, a dispute with Mexico concerning the boundaries of a large region west of the Rio Grande resulted in the Gadsden Purchase. The Gadsden Purchase (Treaty of Mesilla) gave to the United States land west of the Rio Grande and enabled the railroad to be completed to California.

During the Civil War, the town of Mesilla was taken by Texas Confederate forces and was declared the capital of the Territory of Arizona. After the war, Arizona was made a separate territory, which did not include Mesilla.

The Santa Fe railroad was completed in 1881, bringing a large number of settlers to Las Cruces and Mesilla. By the end of the century there was considerable mining activity. In 1916, the construction of Elephant Butte Dam, north of Dona Ana County, was completed. The valley area of Dona Ana County is served by this project. The irrigation and drainage systems downstream from the storage dam represent the highest development of irrigation in the state. The dam has been the most important contribution to development of the county. Levees were completed in 1940 to control flooding along the river.

The population of Dona Ana County has grown from 300 in 1849 to 84,000 in 1976.

How this survey was made

Soil scientists made this survey to learn what kinds of soil are in the survey area, where they are, and how they can be used. The soil scientists went into the area knowing they likely would locate many soils they already knew

something about and perhaps identify some they had never seen before. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; the kinds of native plants or crops; the kinds of rock; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material, which has been changed very little by leaching or by the action of plant roots.

The soil scientists recorded the characteristics of the profiles they studied, and they compared those profiles with others in counties nearby and in places more distant. Thus, through correlation, they classified and named the soils according to nationwide, uniform procedures.

After classifying and naming the soils, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, roads, and other details that help in drawing boundaries accurately. The soil map at the back of this publication was prepared from aerial photographs.

The areas shown on a soil map are called map units. Some map units are made up of one kind of soil, others are made up of two or more kinds of soil, and a few have little or no soil material at all. Map units are discussed in the sections "General soil map for broad land use planning" and "Soil maps for detailed planning."

While a soil survey is in progress, samples of soils are taken as needed for laboratory measurements and for engineering tests. The soils are field tested, and interpretations of their behavior are modified as necessary during the course of the survey. New interpretations are added to meet local needs, mainly through field observations of different kinds of soil in different uses under different levels of management. Also, data are assembled from other sources, such as test results, records, field experience, and information available from state and local specialists. For example, data on crop yields under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soil.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so that it is readily available to farmers, managers of rangeland, engineers, planners, developers and builders, home buyers, and others.

General soil map for broad land use planning

The general soil map at the back of this publication shows map units that have a distinct pattern of soils, relief, and drainage. Each map unit is a unique natural landscape. Typically, a map unit consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in other units but in a different pattern.

The general soil map provides a broad perspective of the soils and landscapes in the survey area. It provides a basis for comparing the potential of large areas for general kinds of land use. Areas that are, for the most part, suited to certain kinds of farming or to other land uses can be identified on the map. Likewise, areas of soils having properties that are distinctly unfavorable for certain land uses can be located.

Because of its small scale, the map does not show the kind of soil at a specific site. Thus, it is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The kinds of soil in any one map unit differ from place to place in slope, depth, stoniness, drainage, or other characteristics that affect their management.

Deep, nearly level, well drained soils that formed in alluvium; on flood plains and stream terraces

The soils in this group make up about 6 percent of the survey area. The soils are used for irrigated crops and pasture and community development and as wildlife habitat and rangeland.

1. Glendale-Harkey

Deep, nearly level, well drained soils that formed in alluvium; on flood plains and stream terraces

This map unit is made up of nearly level alluvial soils on flood plains and stream terraces of the Rio Grande and its tributaries. Elevation ranges from 3,700 to 4,120 feet. Slopes are 0 to 1 percent. Areas of this map unit are long and narrow and are in the northwestern, central, and southeastern parts of the survey area. The average annual precipitation is 8 inches, and the average annual temperature is 60 degrees F.

This map unit makes up about 6 percent of the survey area. Glendale soils make up about 21 percent of this map unit; Harkey soils, 19 percent; and Brazito soils, 10 percent. Adelino, Agua, Anapra, Anthony, Armijo, Belen, Vinton, Agua Variant, Belen Variant, and Vinton Variant soils and Riverwash make up the rest.

Glendale soils are deep and well drained. They formed in alluvium and are in slight depressions on flood plains and stream terraces. Typically, the surface layer is clay loam and the layers below that are clay loam and very fine sandy loam.

Harkey soils are deep and well drained. They formed in alluvium and are on flood plains and stream terraces. Typically, the surface layer is loam, and the layers below that are very fine sandy loam and silt loam.

Brazito soils are deep and well drained. They formed in alluvium and are on flood plains and stream terraces

near river channels. Typically, the surface layer is loamy fine sand and below that there is sand.

The soils in this map unit are used for irrigated crops and pasture, community development, and unimproved native pasture and as wildlife habitat. Most of the areas have been leveled, and some have been drained. Some of the undrained areas are swampy. Most are protected from flood waters of the Rio Grande by levees.

The soils in this map unit are well suited to a wide variety of irrigated crops, pasture, trees, and windbreaks. Much of the unimproved native pasture receives extra moisture from irrigation tailwater or a seasonal water table.

Community development continually encroaches upon the irrigated cropland. If engineering structures are planned, detailed onsite investigation is needed because of the variability and complex pattern of the soils. The water table is generally at a depth of 5 to 15 feet—deep enough that it is not a problem for most uses. In some areas, contamination of the water supply is a hazard if the soils are used for septic tank filter fields or sanitary landfill.

The potential of these soils is good for habitat for openland wildlife. Pasture, hay, and clean-tilled row crops provide food and cover for scaled and Gambel quail, white-winged and mourning dove, pheasant, sandhill crane, some waterfowl species, and other wildlife.

Shallow or deep, nearly level to very steep, well drained to excessively drained soils that formed in alluvium, alluvium modified by wind, and eolian material; on fans, terraces, ridges, valley and basin floors, flood plains, and piedmonts

There are 7 map units in this group, and they make up about 57 percent of the survey area. The soils are used for community development and military purposes and as wildlife habitat, rangeland, and watershed.

2. Bluepoint

Deep, gently undulating to moderately rolling, somewhat excessively drained soils that formed in alluvium modified by wind; on fans, terraces, and ridges

This map unit is made up of gently undulating to moderately rolling soils on fans, terraces, and ridges along the Rio Grande and its tributaries. Areas are long and narrow and are in the northwest, central, and southeast parts of the survey area. Elevation ranges from 3,700 to 4,400 feet. Slopes range from 1 to 15 percent. The average annual precipitation is 8 inches, and the average annual temperature is 60 degrees F.

This map unit makes up about 5 percent of the survey area. Bluepoint soils make up about 65 percent of this map unit. Arizo, Caliza, Canutio, and Yturbide soils and Riverwash make up the rest.

Bluepoint soils are deep and somewhat excessively drained. They formed in alluvium that has been modified by wind and are on fans, terraces, and ridges. Typically, the surface layer is loamy sand, and below that there is loamy fine sand.

These soils are used for community development and as wildlife habitat and rangeland. Some areas in the Las Cruces area and areas that are next to irrigated areas have been subdivided into lots for community development. The main problem in the use of these soils is that many arroyos cut the areas and are a source of sedimentation. The use of terraces and retaining walls for slope stability can help overcome soil blowing.

The potential of these soils is poor for habitat for rangeland wildlife and fair for habitat for openland wildlife. The native plants and cultivated crops provide food and cover for scaled and Gambel quail, white-winged and mourning dove, pheasant, mule deer, and other wildlife.

3. Caliza-Bluepoint-Yturbide

Deep, gently undulating to very steep, well drained, somewhat excessively drained, and excessively drained soils that formed in alluvium, gravelly alluvium, and alluvium modified by wind; on fans and terraces

This map unit is made up of gently undulating to very steep soils on fans and terraces along the Rio Grande and its tributaries. Elevation ranges from 3,800 to 4,400 feet. Slopes range from 1 to 40 percent. Areas are long and narrow and are in the northwest, central, and southeast parts of the survey area. The average annual precipitation is 8 inches, and the average annual temperature is 60 degrees F.

This map unit makes up about 5 percent of the survey area. Caliza soils make up about 24 percent of this map unit; Bluepoint soils, 20 percent; and Yturbide soils, 19 percent. Haplargids, dissected; clay and sandstone outcrops; and Arizo, Canutio, and Nickel soils make up the rest.

The Caliza soils are deep and well drained. They formed in gravelly alluvium on fans and terraces along the upper margin of the Rio Grande Valley. Typically, the surface layer is very gravelly sandy loam, and the layers below that are very gravelly loamy sand and sand.

The Bluepoint soils are deep and somewhat excessively drained. They formed in alluvium that has been modified by wind and are on fans and terraces. Typically, the surface layer is loamy sand, and below that there is loamy fine sand.

The Yturbide soils are deep and excessively drained. They formed in alluvium and are on side and terminal fans of arroyos and river deposits. Typically, the surface layer is loamy sand, and the layers below that are gravelly loamy sand and sand.

The soils in this map unit are used mainly as rangeland, wildlife habitat, and watershed. In some areas, they are a potential source of sand and gravel.

The potential of these soils is fair for habitat for rangeland wildlife. The native plants provide food and cover for scaled and Gambel quail, white-winged and mourning dove, mule deer, pronghorn antelope, and other wildlife.

4. Pajarito-Onite-Pintura

Deep, nearly level to undulating, well drained and somewhat excessively drained soils that formed in alluvium, alluvium modified by wind, and eolian material; on fans

This map unit is made up of nearly level to undulating soils on fans. Elevation ranges from 4,000 to 5,000 feet. Slopes range from 0 to 5 percent. Areas are irregularly shaped. The average annual precipitation is 8 inches, and the average annual temperature is 62 degrees F.

This map unit makes up about 5 percent of the survey area. Pajarito soils make up about 42 percent of the map unit; Onite soils, 36 percent; and Pintura soils, 15 percent. Adelino, Berino, Bluepoint, Dona Ana, Harrisburg, Simona, Wink, and Yturbide soils make up the rest.

Pajarito soils are deep and well drained. They formed in alluvium that has been modified by wind and are between dunes on fans. Typically, the surface layer is fine sandy loam, and below that there is fine sandy loam.

Onite soils are deep and well drained. They formed in alluvium and are on fans. Typically, the surface layer is loamy sand, and the layers below that are sandy loam and loamy sand.

Pintura soils are deep and somewhat excessively drained. They formed in eolian material and are on dunes on fans. Typically, the surface layer is fine sand, and below that there is fine sand.

The soils in this map unit are used as rangeland, wildlife habitat, and watershed and for military purposes. The potential of these soils is poor for habitat for rangeland wildlife. The native plants provide food and cover for scaled and Gambel quail, white-winged and mourning dove, pronghorn antelope, and other wildlife.

5. Pintura-Wink

Deep, nearly level to undulating, well drained and somewhat excessively drained soils that formed in alluvium, alluvium modified by wind, and eolian material; on fans

This map unit is made up of nearly level to undulating soils on fans. Elevation ranges from 4,000 to 5,000 feet. Slopes range from 0 to 5 percent. Areas are irregularly shaped. The average annual precipitation is 8 inches, and the average annual temperature is 62 degrees F.

This map unit makes up about 16 percent of the survey area. Pintura soils make up about 27 percent of this map unit; Wink soils, 26 percent; and Onite soils, 10 percent. Berino, Bucklebar, Dona Ana, Harrisburg, Pajarito, and Simona soils make up the rest.

The Pintura soils are deep and somewhat excessively drained. They formed in eolian material on dunes on fans. Typically, the surface layer is fine sand, and below that there is fine sand.

The Wink soils are deep and well drained. They formed in alluvium that has been modified by wind; they are between dunes on fans. Typically, the surface layer is loamy fine sand, and below that there is fine sandy loam, sandy loam, and loamy fine sand.

The Onite soils are deep and well drained. They formed in alluvium between dunes on fans. Typically, the surface layer is loamy sand, and the layers below that are sandy loam and loamy sand.

These soils are used mainly as rangeland, wildlife habitat, and watershed and for military purposes. Several tracts have been subdivided into building lots.

The potential of these soils is poor for habitat for rangeland wildlife. The native plants provide food and cover for scaled and Gambel quail, white-winged and mourning dove, pronghorn antelope, and other wildlife.

6. Berino-Dona Ana

Deep, gently undulating to undulating, well drained soils that formed in alluvium and alluvium modified by wind; on fans, piedmonts, and valley and basin floors

This map unit is made up of gently undulating to undulating soils on fans, piedmonts, and valley and basin floors. Elevation ranges from 4,000 to 5,000 feet. Slopes range from 1 to 5 percent. Areas are irregularly shaped. The average annual precipitation is 8 inches, and the average annual temperature is 62 degrees F.

This map unit makes up about 9 percent of the survey area. Berino soils make up about 45 percent of the map unit; Dona Ana soils, 18 percent; and Reagan soils, 10 percent. Bucklebar, Cacique, Onite, Pajarito, Pintura, Stellar, and Wink soils make up the rest.

Berino soils are deep and well drained. They formed in alluvium that has been modified by wind and are on fans, piedmonts, and valley floors. Typically, the surface layer is loamy fine sand, and the layers below that are fine sandy loam and sandy clay loam.

Dona Ana soils are deep and well drained. They formed in alluvium on fans and piedmonts. Typically, the surface layer is fine sandy loam, and the layers below that are sandy clay loam and sandy loam.

Reagan soils are deep and well drained. They formed in alluvium on fans and basin floors. Typically, the surface layer is clay loam, and the layers below that are clay loam and silty clay loam.

These soils are used mainly as rangeland, wildlife habitat, and watershed and for military purposes. Several tracts along Highway 70, from Las Cruces to Organ Pass, have been subdivided into building lots. In small areas near these tracts, the soils are used for irrigated crops.

The potential of these soils is poor for habitat for rangeland wildlife. The native plants provide food and cover for scaled and Gambel quail, white-winged and mourning dove, pronghorn antelope, and other wildlife.

7. Mimbres-Stellar

Deep, nearly level to gently undulating, well drained soils that formed in alluvium; on fans, basin floors, and flood plains

This map unit is made up of nearly level to gently undulating soils on fans, basin floors, and flood plains. Elevation ranges from 4,000 to 5,000 feet. Slopes range from 0 to 3 percent. Areas are long and narrow. The average annual precipitation is 8 inches, and the average annual temperature is 61 degrees F.

This map unit makes up about 2 percent of the survey area. Mimbres soils make up about 51 percent of this map unit; Stellar soils make up 17 percent. Berino, Bucklebar, Dona Ana, and Reagan soils and similar soils that are fine textured and have a high content of clay make up the rest.

The Mimbres soils are deep and well drained. They formed in alluvium and are in slight depressions and drainageways on fans and flood plains. Typically, the surface layer is silty clay loam, and below that there is silty clay loam.

The Stellar soils are deep and well drained. They formed in alluvium on fans, basin floors, and flood plains. Typically, the surface layer is clay loam, and the layers below that are clay, clay loam, and sandy clay loam.

These soils are used mainly as rangeland, wildlife habitat, and watershed and for military purposes. The potential of these soils is poor for habitat for rangeland wildlife. The native plants provide food and cover for scaled and Gambel quail, white-winged and mourning dove, pronghorn antelope, and other wildlife.

8. Nickel-Upton

Shallow or deep, undulating to moderately rolling, well drained soils that formed in gravelly and very gravelly alluvium; on fans, terraces, ridges, and piedmonts

This map unit is made up of undulating to moderately rolling soils on fans, terraces, ridges, and piedmonts. Elevation ranges from 4,000 to 5,500 feet. Slopes range from 3 to 15 percent. Areas are irregularly shaped. The average annual precipitation is 8 inches, and the average annual temperature is 62 degrees F.

This map unit makes up about 15 percent of the survey area. Nickel soils make up about 40 percent of this map unit; Upton soils, 23 percent; and Tencee soils, 9 percent. Berino, Cave, Dona Ana, Masonfort, Mimbres, and Simona soils and Badland make up the rest.

The Nickel soils are deep and well drained. They formed in very gravelly alluvium and are on terraces and piedmonts. Typically, the surface layer is very gravelly fine sandy loam, and below that there is very gravelly sandy loam.

The Upton soils are shallow and well drained. They formed in gravelly alluvium and are on piedmont slopes and ridges. Typically, the surface layer is gravelly sandy loam, and below that there is gravelly sandy loam over indurated caliche.

The Tencee soils are shallow and well drained. They formed in gravelly alluvium and are on fans and ridges. Typically, the surface layer is very gravelly sandy loam, and below that there is carbonate-cemented material.

These soils are used mainly as rangeland, wildlife habitat, and watershed and for military purposes. The potential of these soils is poor for habitat for rangeland wildlife. The native plants provide food and cover for scaled and Gambel quail, white-winged and mourning dove, and other wildlife.

Shallow to deep, nearly level to undulating, well drained soils that formed in residuum, alluvium, and eolian material; on mesas, plains, ridges, basin floors, and fans

There are 2 map units in this group, and they make up about 15 percent of the survey area. The soils are used as rangeland, wildlife habitat, and watershed.

9. Cacique-Cruces

Shallow to moderately deep, nearly level to gently sloping, well drained soils that formed in alluvium; on basin floors

This map unit is made up of nearly level to gently sloping soils on basin floors. Elevation ranges from 4,000 to 5,000 feet. Slopes range from 0 to 5 percent. Areas of this map unit are irregularly shaped and are in the central and northern parts of the survey area. The average annual precipitation is 8 inches, and the average annual temperature is 62 degrees F.

This map unit makes up about 2 percent of the survey area. Cacique soils make up about 38 percent of the map unit; Cruces soils, about 27 percent. Berino, Bucklebar, Dona Ana, Onite, Pajarito, Pintura, and Simona soils make up the rest.

Cacique soils are moderately deep and well drained. They formed in alluvium on basin floors. Typically, the surface layer is loamy sand, and the layers below that are sandy loam and sandy clay loam.

Cruces soils are shallow and well drained. They formed in alluvium on basin floors. Typically, the surface layer is loamy sand, and below that there is fine sandy loam and sandy clay loam over carbonate-cemented material.

These soils are used mainly as rangeland, wildlife habitat, and watershed. The potential of these soils is poor for habitat for rangeland wildlife. The native plants provide food and cover for scaled and Gambel quail, white-winged and mourning dove, pronghorn antelope, and other wildlife.

10. Harrisburg-Simona-Wink

Shallow to deep, gently undulating to undulating, well drained soils that formed in residuum from sandstone,

eolian material, and alluvium modified by wind; on mesas, plains, ridges, and fans

This map unit is made up of gently undulating to undulating soils on mesas, plains, ridges, and fans. Elevation ranges from 4,000 to 5,000 feet. Slopes range from 1 to 5 percent. Areas are irregularly shaped. The average annual precipitation is 8 inches, and the average annual temperature is 62 degrees F.

This map unit makes up about 13 percent of the survey area. Harrisburg soils make up about 24 percent of this map unit; Simona soils, 21 percent; and Wink soils, 21 percent. Cacique, Cruces, Onite, Pajarito, and Pintura soils make up the rest.

The Harrisburg soils are moderately deep and well drained. They formed in residuum and eolian material and are in slight depressions on mesas. Typically, the surface layer is loamy fine sand, and below that there is fine sandy loam over indurated caliche.

The Simona soils are shallow and well drained. They formed in eolian material on plains, the top of mesas, and ridges. Typically, the surface layer is sandy loam, and below that there is sandy loam over indurated caliche.

The Wink soils are deep and well drained. They formed in alluvium that has been modified by wind and are on fans. Typically, the surface layer is loamy fine sand, and the layers below that are fine sandy loam, sandy loam, and loamy fine sand.

These soils are used mainly as rangeland, wildlife habitat, and watershed. The potential of these soils is poor for habitat for rangeland wildlife. The native plants provide food and cover for scaled and Gambel quail, white-winged and mourning dove, pronghorn antelope, and other wildlife.

Rock outcrop and shallow to deep, gently undulating to extremely steep, well drained soils that formed in alluvium, colluvium, residuum, and eolian material; on mountains, uplands, and ridges

There are 3 map units in this group, and they make up about 22 percent of the survey area. Areas of these map units are used as rangeland, wildlife habitat, and watershed and for military purposes.

11. Rock outcrop-Motoqua

Rock outcrop and shallow, moderately rolling to extremely steep, well drained soils that formed in alluvium and colluvium; on mountains

This map unit is made up of Rock outcrop and moderately rolling to extremely steep soils on mountains. Elevation ranges from 4,600 to 6,650 feet. Slopes range from 10 to 75 percent. Areas of this map unit are irregularly shaped and are in the northwest part of the survey area. The average annual precipitation is 15 inches, and the average annual temperature is 50 degrees F.

This map unit makes up about 4 percent of the survey area. Rock outcrop makes up about 36 percent of this map unit; Motoqua soils make up 30 percent. Soils that are similar to Motoqua soils and soils that are deep make up the rest. Rock outcrop occupies ridgetops, very steep mountainsides, and fault lines.

Rock outcrop consists of basic igneous and sandstone bedrock as extrusions, escarpments, ledges, and ridges.

The Motoqua soils are shallow and well drained. They formed in alluvium and colluvium and are on mountains. Typically, the surface layer is cobbly loam, and below that there is cobbly silt loam.

Areas of this map unit are used mainly as rangeland, wildlife habitat, and watershed. The potential of the soils is fair for habitat for rangeland wildlife. The native plants provide food and cover for scaled and Gambel quail, white-winged and mourning dove, mule deer, pronghorn antelope, and other wildlife.

12. Akela-Rock outcrop-Aftaden

Rock outcrop and shallow, gently undulating to moderately rolling, well drained soils that formed in eolian material and residuum from basalt; on lava flows, uplands, and ridges

This map unit is made up of Rock outcrop and gently undulating to moderately rolling soils on uplands, ridges, and lava flows. Elevation ranges from 4,000 to 5,000 feet. Slopes range from 1 to 15 percent. Areas of this map unit are irregularly shaped and are in the southwest part of the survey area. The average annual precipitation is 8 inches, and the average annual temperature is 62 degrees F.

This map unit makes up about 8 percent of the survey area. Akela soils make up about 28 percent of the map unit; Rock outcrop, 23 percent; and Aftaden soils, 13 percent. Minlith, Nickel, Onite, Pajarito, and Pintura soils make up the rest.

The Akela soils are shallow and well drained. They formed in basalt residuum and are on lava flows and ridges. Typically, the surface layer is gravelly and very gravelly sandy loam, and below that there is very gravelly sandy loam over basalt.

Rock outcrop consists of basalt extrusions, ledges, and ridges.

The Aftaden soils are shallow and well drained. They formed in eolian material and residuum of basalt and are on uplands. Typically, the surface layer is loamy sand, and below that there is fine sandy loam over basalt.

Areas of this map unit are used mainly as rangeland, wildlife habitat, and watershed. The potential of the soils is fair for habitat for rangeland wildlife. The native plants provide food and cover for scaled and Gambel quail, white-winged and mourning dove, pronghorn antelope, and other wildlife.

13. Rock outcrop-Torriorthents

Rock outcrop and shallow to deep, hilly to extremely steep, well drained soils that formed in alluvium and colluvium; on mountains

This map unit is made up of Rock outcrop and hilly to extremely steep soils on mountains. Elevation ranges from 4,000 to 8,870 feet. Slopes range from 15 to 100 percent. Areas are irregularly shaped. The average annual precipitation is 13 inches, and the average annual temperature is 55 degrees F.

This map unit makes up about 10 percent of the survey area. Rock outcrop makes up about 40 percent of the map unit; Torriorthents, 16 percent; and Argids, 12 percent. Similar broad groups of soils and Lozier soils make up the rest.

Rock outcrop consists of extrusions, escarpments, ledges, ridges, and cliffs.

Torriorthents and Argids are shallow to deep and well drained. They formed in alluvium and colluvium and are on mountains. There is no typical profile for these broad groups of soils.

Areas of this map unit are used mainly as rangeland, wildlife habitat, and watershed and for military purposes. The potential of the soils is variable for habitat for rangeland wildlife. The native plants provide food and cover for harlequin quail, white-winged and mourning dove, mule deer, mountain lion, desert bighorn sheep, and other wildlife.

Soil maps for detailed planning

The map units shown on the detailed soil maps at the back of this publication represent the kinds of soil in the survey area. They are described in this section. The descriptions together with the soil maps can be useful in determining the potential of a soil and in managing it for food and fiber production; in planning land use and developing soil resources; and in enhancing, protecting, and preserving the environment. More information for each map unit, or soil, is given in the section "Use and management of the soils."

Preceding the name of each map unit is the symbol that identifies the soil on the detailed soil maps. Each soil description includes general facts about the soil and a brief description of the soil profile. In each description, the principal hazards and limitations are indicated, and the management concerns and practices needed are discussed.

The map units on the detailed soil maps represent an area on the landscape made up mostly of the soil or soils for which the unit is named.

The descriptions, names, and delineations of soils in this survey area do not fully agree with those of similar soil materials in surveys of adjacent counties published at a different date. Differences are the result of better knowledge of soils, modifications in series concepts, intensity of mapping, and the extent of soils within the survey area.

The soils in this survey area were mapped at two levels of detail to meet expected uses. Irrigated cropland and areas adjacent to the Rio Grande Valley were mapped in high detail, using narrowly defined map units. This means that soil boundaries were plotted and verified at closely spaced intervals. The map units named as a phase of a soil series or as a complex are primarily narrowly defined map units.

The rest of the survey area, where the soils are used mainly for recreation and military purposes and as rangeland and wildlife habitat, was mapped in low detail, using broadly defined map units. Soil boundaries were plotted and verified at wider intervals. These units are less homogeneous than the narrowly defined map units, but mapping has been controlled well enough for the anticipated use of the soils. Map units named as associations are primarily broadly defined map units.

The second letter in the map unit symbol is lower case if the map unit is narrowly defined and upper case if the map unit is broadly defined.

Soils that have profiles that are almost alike make up a *soil series*. Except for allowable differences in texture of the surface layer or of the underlying substratum, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement in the profile. A soil series commonly is named for a town or geographic feature near the place where a soil of that series was first observed and mapped. The Anthony series, for example, was named for the town of Anthony in Dona Ana County.

Soils of one series can differ in texture of the surface layer or in the underlying substratum and in slope, erosion, stoniness, salinity, wetness, or other characteristics that affect their use. On the basis of such differences, a soil series is divided into phases. The name of a *soil phase* commonly indicates a feature that affects use or management. For example, Glendale loam is one of several phases within the Glendale series.

Some map units are made up of two or more dominant kinds of soil. Such map units are called soil complexes, soil associations, and undifferentiated groups.

A *soil complex* consists of areas of two or more soils that are so intricately mixed or so small in size that they cannot be shown separately on the soil map. Each area includes some of each of the two or more dominant soils, and the pattern and proportion are somewhat similar in all areas. Onite-Pintura complex is an example.

A *soil association* is made up of soils that are geographically associated and are shown as one unit on the map because it is not practical to separate them. A soil association has considerable regularity in geographic pattern and in the kinds of soil that are a part of it. The extent of the soils can differ appreciably from one delineation to another; nevertheless, interpretations can be made for use and management of the soils. Berino-Bucklebar association is an example.

An *undifferentiated group* is made up of two or more soils that could be mapped individually but are mapped as one unit because there is little value in separating them. The pattern and proportion of the soils are not uniform. An area shown on the map has at least one of the dominant (named) soils or may have all of them. Canutio and Arizo gravelly sandy loams is an undifferentiated group in this survey area.

Most map units include small, scattered areas of soils other than those that appear in the name of the map unit. Some of these soils have properties that differ substantially from those of the dominant soil or soils and thus could significantly affect use and management of the map unit. These soils are described in the description of each map unit. Some of the more unusual or strongly contrasting soils that are included are identified by a special symbol on the soil map.

Most mapped areas include places that have little or no soil material and support little or no vegetation. Such places are called *miscellaneous areas*; they are delineated on the soil map and given descriptive names. Riverwash is an example. Some of these areas are too small to be delineated and are identified by a special symbol on the soil map.

The acreage and proportionate extent of each map unit are given in table 4, and information on properties, limitations, capabilities, and potentials for many soil uses is given for each kind of soil in other tables in this survey. (See "Summary of tables.") Many of the terms used in describing soils are defined in the Glossary.

Soil descriptions

Ad—Adelino sandy clay loam. This is a deep, well drained, nearly level soil on old fans, 8 to 15 feet above the flood plain of the Rio Grande at an elevation of 3,700 to 4,120 feet. Areas of this soil have been leveled for use as irrigated cropland. The average annual precipitation is 8 inches, the average annual temperature is 60 degrees F, and the average frost-free period is 200 days.

Included in mapping are areas of similar soils that are moderately coarse textured throughout and areas of Adelino clay loam and Bluepoint soils. The included soils make up 15 percent of the map unit; the area of each inclusion is generally less than 1 acre.

Typically, the surface layer is light brown sandy clay loam 10 inches thick. The subsoil is light brown sandy clay loam about 11 inches thick. The substratum is light brown sandy clay loam and very pale brown sandy loam to a depth of 60 inches.

Permeability is moderate. The depth of the root zone is 60 inches. The available water capacity is high. The content of organic matter in the surface layer is low. Surface runoff is medium, and the water erosion hazard is slight. The soil blowing hazard is high.

If irrigated, this soil is suited to small grains, cotton, grain sorghum, legumes, grasses, nut crops, and vegetables. The primary crops are alfalfa hay, cotton, and small grains.

Planting crops that produce a large amount of residue and returning this residue to the soil or growing grasses and legumes in rotation helps to control soil blowing and to maintain the physical condition of the soil. Fertilization and improved water management practices help to maintain or increase yields. All crops except legumes generally respond to nitrogen fertilizer. Legumes respond to phosphate fertilizer. Irrigation water can be applied efficiently if properly designed surface, subsurface, or drip irrigation systems are installed. Rotation grazing increases the yield and quality of pasture grasses. Timely harvesting improves the quality of crops.

If irrigated, this soil has good potential for windbreaks. Arizona cypress, Rocky Mountain juniper, green ash, cottonwood (cottonless), Siberian elm, and Russian-olive are suitable trees; and skunkbush sumac, pyracantha, oriental arborvitae, and American plum are suitable shrubs. Special treatment to overcome specific soil conditions may be needed for other species.

As a result of rapid urban expansion in the Mesilla Valley some areas of this Adelino soil are used for urban development. This soil has moderate limitations for most types of urban and recreation development. There is a hazard of shrink-swell, but this hazard can be reduced by good design and careful installation procedures.

Ae—Adelino clay loam. This is a deep, well drained, nearly level soil that formed in alluvium on old fans. It is 8 to 15 feet above the flood plain of the Rio Grande at an elevation of 3,700 to 4,120 feet. Areas of this soil have been leveled for irrigated cropland. The average annual precipitation is 8 inches, the average annual air temperature is 60 degrees F, and the average frost-free period is 200 days.

Included in mapping are areas of similar soils that are moderately coarse textured throughout and areas of Adelino sandy clay loam and Bluepoint soils. The included soils make up 15 percent of the map unit; the area of each inclusion is generally less than 1 acre.

Typically, the surface layer is light brown clay loam 5 inches thick. The subsoil is brown and light brown clay loam and silty clay loam 22 inches thick. The substratum is light brown loam to a depth of 60 inches.

Permeability is moderate. The depth of the root zone is 60 inches. The available water capacity is high. The content of organic matter is low in the surface layer. Surface runoff is medium, and the water erosion hazard is slight. The soil blowing hazard is high.

If irrigated, this soil is suited to small grains, grain sorghum, legumes, grasses, nut crops, and vegetables. The primary crops are alfalfa hay, cotton, and small grains.

Planting crops that produce a large amount of residue and returning this residue to the soil or growing grasses and legumes in rotation helps to control soil blowing and maintain the physical condition of the soil. Fertilization

and improved water management practices help maintain or increase yields. All crops except legumes generally respond to nitrogen fertilizer. Legumes respond to phosphate fertilizer. Irrigation water can be applied efficiently if properly designed surface, subsurface, or drip irrigation systems are installed. Rotation grazing increases yields and the quality of pasture. Timely harvesting improves the quality of crops.

If irrigated, this soil has good potential for windbreaks. Arizona cypress, Rocky Mountain juniper, green ash, cottonwood (cottonless), Siberian elm, and Russian-olive are suitable trees; and skunkbush sumac, pyracantha, oriental arborvitae, and American plum are suitable shrubs. Special treatment to overcome specific soil conditions may be needed for other species.

As a result of rapid urban expansion in the Mesilla Valley, some areas of this Adelino soil are used for urban development. This soil has moderate limitations for most types of urban and recreational development. There is a hazard of shrink-swell, but the hazard can be reduced by good design and careful installation procedures.

AF—Aftaden-Rock outcrop association. This association consists of gently undulating to moderately rolling soils on uplands in the southwestern part of the survey area. Elevation ranges from 4,000 to 5,000 feet. The average annual precipitation is 8 inches, the average annual air temperature is 62 degrees F, and the average frost-free period is 210 days.

This association is about 50 percent Aftaden loamy sand, 1 to 15 percent slopes; 20 percent basalt Rock outcrop; and 20 percent Onite loamy sand, 1 to 5 percent slopes.

Included in mapping and making up about 10 percent of the map unit are areas of Pintura, Minlith, Akela, and Pajarito soils, cinder cones, and areas of basalt Rock outcrop on steeper slopes.

The Aftaden soil is shallow and well drained. It formed in eolian material and residuum from basalt on ridges and lower slopes. Typically, the surface layer is reddish brown loamy sand about 2 inches thick. The subsoil is reddish brown fine sandy loam about 16 inches thick. Lime-coated basalt is at a depth of about 18 inches.

Permeability of the Aftaden soil is moderately rapid. The depth of the root zone is 11 to 20 inches. The available water capacity is very low. Surface runoff is medium, and the water erosion hazard is slight. The soil blowing hazard is very high.

Rock outcrop consists of basalt extrusions, lava flows, ridges, and cliffs. There is little or no vegetation.

The Onite soil is deep and well drained. It formed in alluvium that derived from dominantly acid igneous rocks and has been modified by wind. This soil is in depressions and swales and on fans between lava flows. Typically, the surface layer is brown loamy sand about 5 inches thick. The subsoil is reddish brown sandy loam 13 inches thick. The substratum is light reddish brown loamy sand to a depth of 60 inches.

Permeability of the Onite soil is moderately rapid. The depth of the root zone is 60 inches or more. The available water capacity is moderate. Surface runoff is medium, and the water erosion hazard is moderate. The soil blowing hazard is high.

Only the Onite soil is suited to irrigation. The Aftaden soil is too shallow and has a very low available water capacity.

The potential plant community on the Aftaden soil includes black grama, sand dropseed, mesa dropseed, bush muhly, and yucca. The potential plant community on the Onite soil includes black grama, mesa dropseed, sand dropseed, threeawn, and broom snakeweed. Numerous forbs, mostly seasonal, are found on these soils.

Range seeding is generally impractical because of limited rainfall. Mesquite can be controlled chemically or removed by hand grubbing. Mechanical removal is generally not recommended. Fences and pipelines are difficult to install on Aftaden soils because of the shallow depth to bedrock; earthen ponds are also generally impractical.

Ag—Agua loam. This is a deep, well drained, nearly level soil that formed in mixed alluvium on the flood plain of the Rio Grande. Elevation ranges from 3,700 to 4,120 feet. Areas of this soil have been leveled for irrigated cropland and are protected from the floodwater of the Rio Grande by dams and levees. The average annual precipitation is 8 inches, the average annual air temperature is 60 degrees F, and the average frost-free period is 200 days.

Included in mapping are small areas of Agua clay loam and Harkey, Anthony, Vinton, and Brazito soils. Also included are areas of Agua loam that are not protected by levees and are susceptible to flooding. In these areas the soil is used only for grazing, recreation, and wildlife habitat. The included soils make up 15 percent of the map unit; the area of each inclusion is generally less than 1 acre.

Typically, the surface layer is pale brown loam about 12 inches thick. The underlying material, to a depth of 23 inches, is pale brown loam. Below that, to a depth of 60 inches, it is very pale brown fine sand.

Permeability is moderate. The depth of the root zone is 60 inches or more. The available water capacity is moderate. The content of organic matter is low in the surface layer. Surface runoff is slow, and the water erosion hazard is slight. The soil blowing hazard is high.

If irrigated, this soil is suited to small grains, cotton, grain sorghum, legumes, grasses, vegetables, and nut crops. The primary crops are alfalfa hay, cotton, and small grains. The major limitation is the moderate available water capacity.

Planting crops that produce large amounts of residue and returning this residue to the soil or growing grasses and legumes in rotation helps to control soil blowing and maintain the physical condition of the soil. Fertilization and improved water management practices help main-

tain or increase yields. All crops except legumes respond to nitrogen fertilizer. Legumes respond to phosphate fertilizer. Irrigation water can be applied efficiently if properly designed surface, subsurface, or sprinkler irrigation systems are installed. Rotation grazing increases yields and the quality of pasture. Timely harvesting improves the quality of crops.

If irrigated, this soil has good potential for windbreaks. Arizona cypress, Rocky Mountain juniper, green ash, cottonwood (cottonless), Siberian elm, and Russian-olive are suitable trees; and skunkbush sumac, pyracantha, oriental arborvitae, and American plum are suitable shrubs. Special treatment to overcome specific soil conditions may be needed for other species.

As a result of rapid urban expansion in the Mesilla Valley, some areas of this Agua soil are used for urban development. This soil has slight limitations for most types of urban and recreation development.

Ah—Agua clay loam. This is a deep, well drained, nearly level soil that formed in mixed alluvium on the flood plain of the Rio Grande. Elevation ranges from 3,700 to 4,120 feet. Areas of this soil have been leveled for irrigated cropland and are protected from floodwater of the Rio Grande by dams and levees. The average annual precipitation is 8 inches, the average annual air temperature is 60 degrees F, and the average frost-free period is 200 days.

Included in mapping are small areas of Harkey, Anthony, Vinton, Anapra, and Glendale soils and Agua loam. Also included are areas of Agua clay loam that are not protected by levees and are susceptible to flooding. In these areas the soil is used only for grazing, recreation, and wildlife habitat. The included soils make up 15 percent of the map unit; the area of each inclusion is generally less than 1 acre.

Typically, the surface layer is light brown clay loam about 12 inches thick. The underlying material, to a depth of 24 inches, is pale brown loam. Below that, to a depth of 60 inches, it is very pale brown sand.

Permeability is moderate. The depth of the root zone is 60 inches or more. The available water capacity is moderate. The content of organic matter is low in the surface layer. Surface runoff is slow, and the water erosion hazard is slight. The soil blowing hazard is high.

If irrigated, this soil is suited to small grains, cotton, grain sorghum, legumes, grasses, vegetables, and nut crops. The primary crops are alfalfa hay, cotton, and small grain. The major limitation is the moderate available water capacity.

Planting crops that produce large amounts of residue and returning this residue to the soil or growing grasses and legumes in rotation helps control soil blowing and maintain the physical condition of the soil. Fertilization and improved water management practices help maintain or increase yields. All crops except legumes respond to nitrogen fertilizers. Legumes respond to phosphate fertilizers. Irrigation water can be applied efficiently if properly designed surface, subsurface, or sprinkler irrigation systems are installed. Rotation grazing increases yields and the quality of pasture. Timely harvesting improves the quality of crops.

If irrigated, this soil has good potential for windbreaks. Arizona cypress, Rocky Mountain juniper, green ash, cottonwood (cottonless), Siberian elm, and Russian-olive are suitable trees; and skunkbush sumac, pyracantha, oriental arborvitae, and American plum are suitable shrubs. Special treatment to overcome specific soil conditions may be needed for other species.

As a result of rapid urban expansion in the Mesilla Valley some areas of this soil are used for urban development. This soil has only slight limitations for most types of urban and recreational development.

AJ—Agua Variant soils, moderately wet. The soils in this undifferentiated group are nearly level and are on the flood plain of the Rio Grande at an elevation of 3,700 to 4,100 feet. Areas are 25 to 300 acres in size and are irregularly shaped. The average annual precipitation is 8 inches, the average annual air temperature is 60 degrees F, and the average frost-free period is 200 days.

This map unit is made up of areas of Agua Variant fine sandy loam, 0 to 1 percent slopes, and similar soils that have a water table at a depth of 24 to 36 inches. These soils are moderately saline affected.

Included in mapping and making up 10 percent of the map unit are areas of soils that are coarse textured. Also included are areas of Agua Variant soils that are not protected by levees and are susceptible to flooding. In these areas the soils are used only for grazing, recreation, and wildlife habitat.

The Agua Variant soil is deep and somewhat poorly drained. It formed in mixed alluvium. Typically, the surface layer is pale brown fine sandy loam 11 inches thick. The underlying material, to a depth of 28 inches, is very pale brown very fine sandy loam. Below that, to a depth of 60 inches, it is very pale brown fine sand.

Permeability of the Agua Variant soil is moderate. The root zone is 25 to 35 inches deep. The available water capacity is very low. Surface runoff is slow, and the water erosion hazard is slight. The soil blowing hazard is high. The water table is at a depth of 12 to 42 inches.

The potential plant community includes alkali sacaton, giant sacaton, inland saltgrass, vine-mesquite, tobosa, and seepwillow.

Grazing should be managed to maintain or improve the vigor, production, and reproduction of such grasses as alkali sacaton and vine-mesquite and to protect grazeable seedlings of riparian vegetation, if present. Fencing pasture to separate it from the adjoining uplands and rotation-deferred grazing are desirable management practices.

These soils are susceptible to encroachment by saltcedar and other invaders, which are detrimental to grazing. Mechanical control of invaders may be limited by wetness, and chemical control may be limited if wildlife

and desirable riparian vegetation are to be considered. Limitations for installing water pipelines and fences for livestock are not severe.

If irrigated, these soils are suited to small grains, grain sorghum, legumes, grasses, and vegetables. They are used primarily for grain sorghum, improved pasture, and small grains. The major limitations are depth to the water table, moderate salinity, and poor drainage.

Planting crops that produce large amounts of residue and returning this residue to the soil or growing grasses and legumes in rotation helps to control soil blowing and maintain the physical condition of the soil. Fertilization and improved water management practices help maintain or increase yields. All crops except legumes respond to nitrogen fertilizers. Legumes respond to phosphate fertilizers. Irrigation water can be applied efficiently if properly designed surface or sprinkler irrigation systems are installed. Rotation grazing increases yields and the quality of pasture. Timely harvesting improves the quality of crops.

If irrigated, these soils have very low potential for windbreaks because of the depth of the water table, moderate salinity, and poor drainage. On-site investigation is necessary to determine what windbreak plantings, if any, can be grown. Special site preparation may be necessary for some species.

These soils are best suited to surface irrigation systems. The irrigation water must be applied carefully to prevent the rise of the water table and the build-up of salt.

These soils have severe limitations for most urban uses and moderate limitations for recreation uses because of the water table and poor drainage. Installing drains and lowering and stabilizing the water table help overcome most limitations. However, most areas of these soils have no drainage outlets.

AK—Agua Variant and Belen Variant soils. These soils are nearly level and are on the flood plain of the Rio Grande at an elevation of 3,700 to 4,100 feet. Areas are 10 to 80 acres in size. The average annual precipitation is 8 inches, the average annual air temperature is 60 degrees F, and the average frost-free period is 200 days. Areas of this map unit are made up of Agua Variant fine sandy loam, 0 to 1 percent slopes, or Belen Variant silty clay, 0 to 1 percent slopes, or both.

Included in mapping and making up 10 percent of the map unit are areas of similar soils that are coarse textured. Also included are areas of Agua Variant and Belen Variant soils that are not protected by levees and are susceptible to flooding. In these areas the soils are used only for grazing and recreation and as wildlife habitat.

The Agua Variant soil is deep and somewhat poorly drained. It formed in mixed alluvium. Typically, the surface layer is very pale brown fine sandy loam 13 inches thick. The underlying material, to a depth of 23 inches, is light gray and light brownish gray very fine sandy loam. Below that, to a depth of 60 inches, it is very pale brown fine sand.

Permeability of the Agua Variant soil is moderate. The root zone is 25 to 35 inches deep. Surface runoff is slow, and the water erosion hazard is slight. The soil blowing hazard is high. The water table is at a depth of 12 to 42 inches. Salinity is high.

The Belen Variant soil is deep and somewhat poorly drained. It formed in clayey and loamy alluvium. Typically, the surface layer is brown silty clay and clay 14 inches thick. The underlying material is light brownish gray silty clay to a depth of 21 inches and pale brown very fine sandy loam to a depth of 38 inches. Below that, to a depth of 60 inches, it is very pale brown very fine sand.

Permeability of the Belen Variant soil is very slow. The root zone is 25 to 35 inches deep. Surface runoff is slow, and the water erosion hazard is slight. The soil blowing hazard is high. The water table is at a depth of 12 to 36 inches. Salinity is high.

The potential plant community includes alkali sacaton, giant sacaton, inland saltgrass, vine-mesquite, tobosa, and seepwillow.

Fencing pasture to separate it from adjoining uplands and rotation-deferred grazing are desirable management practices.

These soils are susceptible to encroachment by saltcedar and other invaders. Mechanical control of invaders may be limited by wetness, and chemical control may be limited if wildlife and desirable riparian vegetation are to be considered. Limitations for installing water pipelines and fences for livestock are not severe.

These soils have severe limitations for most urban and recreational uses because of salinity, wetness, and poor drainage. Installing drains and lowering and stabilizing the water table help overcome most limitations. However, most areas of these soils have no drainage outlets.

AL—Akela-Rock outcrop complex. This complex consists of Rock outcrop and gently undulating to hilly soils on basalt flows. Elevation ranges from 4,000 to 5,000 feet. The average annual precipitation is 8 inches. The average annual air temperature is 62 degrees F, and the average frost-free period is 210 days.

This complex is about 25 percent Akela gravelly sandy loam, 3 to 10 percent slopes; 25 percent Akela gravelly sandy loam, 10 to 25 percent slopes; and 25 percent Rock outcrop. The Akela soils are on the lower ridges and slopes. The Rock outcrop consists of basalt extrusions, lava flows, ridges, and cliffs.

Included in mapping and making up about 25 percent of the map unit are areas of Minlith, Aftaden, Pintura, Nickel, Pajarito, and Onite soils.

The Akela soils are shallow and well drained. They formed in eolian material and residuum of basalt. Typically, the surface layer is light brown gravelly sandy loam and very gravelly sandy loam about 8 inches thick. The underlying material is light brown very gravelly sandy loam about 6 inches thick over caliche-coated fractured basalt rock.

Permeability of the Akela soils is moderate. The depth of the root zone is 10 to 20 inches. The available water capacity is very low. Surface runoff is medium, and water erosion is a moderate hazard. Soil blowing also is a moderate hazard.

Rock outcrop consists of recent basalt deposits. It occurs as large angular boulders or flows that have sharp jagged surfaces and crevices.

The Akela soils are poorly suited to irrigation, mainly because of shallowness to basalt and slope.

The potential plant community includes black grama, bush muhly, sideoats grama, blue grama, tobosa, winterfat, and fourwing saltbush.

Range seeding is impractical because of climatic limitations, Rock outcrop, and slope. Livestock distribution is complicated by Rock outcrop and slope. Pipelines and earthen ponds are difficult or impractical to install because of the shallowness of the soil.

AM—Aladdin-Coxwell association. This association consists of gently undulating to moderately sloping soils on recent fans and old ridges along mountain toe slopes. Elevation ranges from about 4,800 to 6,000 feet. The average annual precipitation is 11 inches, the average annual air temperature is 62 degrees F, and the average frost-free period is 200 days.

This association is about 45 percent Aladdin gravelly sandy loam, 2 to 10 percent slopes, and 30 percent Coxwell gravelly sandy loam, 5 to 15 percent slopes. The Aladdin soil is on recent alluvial fans and terraces that are commonly inset against ridges of older alluvium or monzonite bedrock. The Coxwell soil is on the steeper ridges along the mountain toe slopes.

Included in mapping are areas of soils that are similar to the Aladdin soil, soils that are moderately coarse textured and have a subsoil, and soils that are similar to the Coxwell soil but have a stony and rocky dark surface layer and are fine textured in the upper part of the profile. Also included are areas of Rock outcrop and soils that are shallow to hard rock. These inclusions make up about 25 percent of the map unit.

The Aladdin soil is deep and well drained. It formed in recent gravelly alluvium that derived mostly from monzonite and granite. Typically, the surface layer is grayish brown and dark grayish brown fine gravelly sandy loam about 46 inches thick. The underlying material is grayish brown fine gravelly sandy loam to a depth of 68 inches.

Permeability of the Aladdin soil is moderately rapid. The depth of the root zone is 60 inches or more. The available water capacity is moderate. Runoff is medium, but during intensive rainstorms it is rapid. The water erosion hazard is slight. The soil blowing hazard is moderate.

The Coxwell soil is moderately deep and well drained and formed in gravelly alluvium over weathered granitic bedrock. Typically, the surface layer is brown gravelly sandy loam about 3 inches thick. The subsoil is reddish brown and reddish yellow gravelly clay loam, very gravelly sandy clay loam, and extremely gravelly sandy clay loam 30 inches thick. Weathered granitic bedrock is at a depth of about 33 inches.

Permeability of the Coxwell soil is moderately slow. The depth of the root zone is 33 inches. The available water capacity is very low. Runoff is medium, but during intensive rainstorms, it is rapid. The water erosion hazard is moderate. The soil blowing hazard is high.

The Aladdin soil is suited to irrigated crops. The Coxwell soil is generally too steep and too gravelly.

The potential plant community on the Aladdin soil includes black grama, mesa dropseed, sand dropseed, threeawn, and broom snakeweed. The potential plant community on the Coxwell soil includes black grama, bush muhly, sideoats grama, threeawn, yucca, and winterfat. Forbs are seasonally important components of these plant communities.

Range seeding is generally impractical because of climatic limitations, mainly rainfall. Mesquite can be controlled chemically and can be removed by hand grubbing. Mechanical removal is generally not recommended.

An—Anapra silt loam. This is a deep, well drained, nearly level soil that formed in mixed alluvium on the flood plain of the Rio Grande. Elevation ranges from 3,700 to 4,120 feet. Areas of this soil have been leveled for irrigated cropland and are protected from floodwaters of the Rio Grande by dams and levees. The average annual precipitation is 8 inches, the average annual air temperature is 62 degrees F, and the average frost-free period is 200 days.

Included in mapping are small areas of Anapra clay loam and Glendale, Harkey, and Agua soils. Also included are areas of Anapra silt loam that are not protected by levees and are susceptible to flooding. In these areas the soil is used only for grazing, recreation, and wildlife habitat. The included soils make up 15 percent of the map unit; the area of each inclusion is generally less than one acre.

Typically, the surface layer is brown and pale brown silt loam about 16 inches thick. The underlying material, to a depth of 28 inches, is brown silty clay loam. Below that, to a depth of 60 inches or more, is light gray fine sand.

Permeability is moderately slow. The root zone is 60 inches deep, and the available water capacity is moderate. Surface runoff is slow, and the water erosion hazard is slight. The soil blowing hazard is moderate.

If irrigated, this soil is suited to small grains, cotton, grain sorghum, legumes, grasses, vegetables, and nut crops. The primary crops are alfalfa hay, cotton, and small grains.

Planting crops that produce large amounts of residue and returning this residue to the soil or growing grasses and legumes in rotation helps control soil blowing and maintain the physical condition of the soil. Fertilization and improved water management practices maintain or increase yields. All crops except legumes respond to nitrogen fertilizer. Legumes respond to phosphate fertiliz-

er. Irrigation water can be applied efficiently if properly designed surface, drip, or sprinkler irrigation systems are installed. Rotation grazing increases yields and the quality of pasture. Timely harvesting improves the quality of crops.

If irrigated, this soil has good potential for windbreaks. Arizona cypress, Rocky Mountain juniper, green ash, cottonwood, Siberian elm, and Russian-olive are suitable trees; skunkbush sumac, pyracantha, oriental arborvitae, and American plum are suitable shrubs. Special treatment to overcome specific soil conditions may be needed for other species.

As a result of rapid urban expansion in the Mesilla Valley, areas of this soil are used for urban development. This soil is moderately limited for most types of urban development by shrink-swell and low strength. These limitations can be overcome by proper design. This soil is moderately limited for recreation use by dusty conditions. This limitation can be overcome by maintaining a good vegetative cover.

Ao—Anapra clay loam. This is a deep, well drained, nearly level soil that formed in mixed alluvium on the flood plain of the Rio Grande. Elevation ranges from 3,700 to 4,120 feet. Areas of this soil have been leveled for irrigated cropland and are protected from floodwater of the Rio Grande by dams and levees. The average annual precipitation is 8 inches, the average annual air temperature is 62 degrees F, and the average frost-free period is 200 days.

Included in mapping are small areas of Anapra loam and silt loam and Glendale, Vinton, Harkey, Brazito and Agua soils. Also included are areas of Anapra clay loam that are not protected by levees and are susceptible to flooding. In these areas the soil is used only for grazing, recreation, and wildlife habitat. The included soils make up as much as 15 percent of the map unit; the area of each inclusion is generally less than 1 acre.

Typically, the surface layer is pale brown clay loam about 12 inches thick. The underlying material, to a depth of 28 inches, is pale brown clay loam. Below that, to a depth of 60 inches, it is very pale brown fine sand.

Permeability is moderately slow. The root zone is 60 inches deep, and the available water capacity is moderate. Surface runoff is slow, and the water erosion hazard is slight. The soil blowing hazard is moderate.

If irrigated, this soil is suited to small grains, cotton, grain sorghum, legumes, grasses, vegetables, and nut crops. The primary crops are alfalfa hay, cotton, and small grains. The major limitation is the moderate available water capacity.

Planting crops that produce large amounts of residue and returning the residue to the soil or growing grasses and legumes in rotation helps control soil blowing and maintain the physical condition of the soil. Fertilization and improved water management practices help maintain or increase yields. All crops except legumes respond to nitrogen fertilizers. Legumes respond to phosphate fertilizers. Irrigation water can be applied efficiently if properly designed surface, drip, or sprinkler irrigation systems are installed. Rotation grazing increases yields and the quality of pasture. Timely harvesting improves the quality of crops.

If irrigated, this soil has good potential for windbreaks. Arizona cypress, Rocky Mountain juniper, green ash, cottonwood, Siberian elm, and Russian-olive are suitable trees; skunkbush sumac, pyracantha, oriental arborvitae, and American plum are suitable shrubs. Special treatment to overcome specific soil conditions may be needed for other species.

As a result of rapid urban expansion in the Mesilla Valley, areas of this soil are used for urban development. This soil is moderately limited for most types of urban development by shrink-swell and low strength. These limitations can be overcome by good design and careful installation procedures. This soil has slight limitations for most recreation uses.

Ap—Anthony-Vinton fine sandy loams. These soils are nearly level and are on the flood plain of the Rio Grande at an elevation of 3,700 to 4,120 feet. The areas have been leveled for use as irrigated cropland and are protected from flooding by dams and levees. The average annual precipitation is 8 inches, the average annual air temperature is 60 degrees F, and the average frost-free period is 200 days.

Anthony soils make up about 45 percent of the map unit; Vinton soils make up 30 percent. Included in mapping are areas of Anthony-Vinton loams and Agua soils. Also included are areas of Vinton loam and fine sandy loam, fine-textured substratum, and Anthony-Vinton fine sandy loams that are not protected by levees and are subject to flooding. In these areas, the soils are used only for grazing, recreation, and wildlife habitat. The included soils make up about 25 percent of the map unit.

The Anthony soils are deep and well drained. They formed in alluvium. Typically, the surface layer is brown fine sandy loam about 18 inches thick. The underlying material, to a depth of 38 inches, is pale brown fine sandy loam. Below that, to a depth of 60 inches or more, is pale brown loamy very fine sand.

Permeability of the Anthony soils is moderately rapid. The depth of the root zone is 60 inches or more, and the available water capacity is moderate. Surface runoff is medium, and the water erosion hazard is moderate. The soil blowing hazard is high.

The Vinton soils are deep and well drained. They formed in alluvium. Typically, the surface layer is brown fine sandy loam about 13 inches thick. The underlying material, to a depth of about 41 inches, is pale brown loamy fine sand. Below that, to a depth of 60 inches, it is pale brown fine sandy loam and very pale brown very fine sandy loam.

Permeability of the Vinton soils is moderately rapid. The depth of the root zone is 60 inches or more, and the available water capacity is moderate. Surface runoff is

slow, and the water erosion hazard is slight. The soil blowing hazard is high.

If irrigated, these soils are suited to small grains, cotton, grain sorghum, legumes, grasses, vegetables, and nut crops. The primary crops are alfalfa hay, cotton, and small grains.

Planting crops that produce large amounts of residue and returning the residue to the soil or growing grasses and legumes in rotation helps control soil blowing and maintain the physical condition of the soil. Fertilization and improved water management practices help maintain or increase yields. All crops except legumes respond to nitrogen fertilizers. Legumes respond to phosphate fertilizers. Irrigation water can be applied efficiently if properly designed surface, drip, or sprinkler irrigation systems are installed. Rotation grazing increases yields and the quality of pasture. Timely harvesting improves the quality of crops.

If irrigated, these soils have good potential for windbreaks. Arizona cypress, Rocky Mountain juniper, green ash, cottonwood, Siberian elm, and Russian-olive are suitable trees; skunkbush sumac, pyracantha, oriental arborvitae, and American plum are suitable shrubs. Special treatment to overcome specific soil conditions may be needed for other species.

As a result of rapid urban expansion in the Mesilla Valley, some areas of these soils are used for urban development. These soils have only slight limitations for most urban and recreational uses.

Ar—Anthony-Vinton loams. These soils are nearly level and are on the flood plain of the Rio Grande at an elevation of 3,700 to 4,120 feet. The areas have been leveled for use as irrigated cropland and are protected from floodwaters of the Rio Grande by dams and levees. The average annual precipitation is 8 inches, the average annual air temperature is 60 degrees F, and the average frost-free period is 200 days.

The Anthony soils make up about 50 percent of the map unit; Vinton soils make up 30 percent. The Anthony soils are similar to the Vinton soils, but the Anthony soils are finer textured below the surface layer.

Included in mapping are areas of Anthony-Vinton fine sandy loams, Anthony-Vinton clay loams, and Harkey and Agua loams. These included soils make up about 20 percent of the map unit; the area of each of the included soils is generally less than 1 acre. Also included are areas of Anthony-Vinton soils that are not protected by levees and are subject to flooding. In these areas the soils are used only for grazing, recreation, and wildlife habitat.

The Anthony soils are deep and well drained. They formed in alluvium. Typically, the surface layer is light yellowish brown loam about 18 inches thick. The underlying material is light yellowish brown fine sandy loam to a depth of 60 inches.

Permeability of the Anthony soils is moderately rapid. The depth of the root zone is 60 or more inches. The available water capacity is moderate. The water erosion hazard is slight. The soil blowing hazard is high.

The Vinton soils are deep and well drained. They formed in alluvium. Typically, the surface layer is brown loam about 16 inches thick. The underlying material is light brown loamy fine sand to a depth of 60 inches.

Permeability of the Vinton soils is moderately rapid. The depth of the root zone is 60 inches or more, and the available water capacity is moderate. Surface runoff is slow, and the water erosion hazard is slight. The soil blowing hazard is high.

If irrigated, these soils are suited to small grains, cotton, grain sorghum, legumes, grasses, vegetables, and nut crops. The primary crops are alfalfa hay, cotton, and small grains.

Planting crops that produce a large amount of residue and returning the residue to the soil or growing grasses and legumes in rotation helps control soil blowing and maintain the physical condition of the soil. Fertilization and improved water management practices help maintain or increase yields. All crops except legumes generally respond to nitrogen fertilizer. Legumes respond to phosphate fertilizer. Irrigation water can be applied efficiently if properly designed surface, drip, or sprinkler irrigation systems are installed. Rotation grazing increases yields and the quality of pasture. Timely harvesting improves the quality of crops.

If irrigated, this soil has good potential for windbreaks. Arizona cypress, Rocky Mountain juniper, green ash, cottonwood, Siberian elm, and Russian-olive are suitable trees; and skunkbush sumac, pyracantha, oriental arborvitae, and American plum are suitable shrubs. Special treatment to overcome specific soil conditions may be needed for other species.

As a result of rapid urban expansion in the Mesilla Valley, some areas of the Vinton soils are used for urban development. These soils have slight limitations for most types of urban and recreation development.

As—Anthony-Vinton clay loams. These soils are nearly level and are on the flood plain of the Rio Grande at an elevation of 3,700 to 4,120 feet. The areas have been leveled for use as irrigated cropland and are protected from floodwater of the Rio Grande by dams and levees. The average annual precipitation is 8 inches, the average annual air temperature is 60 degrees F, and the average frost-free period is 200 days.

Anthony soils make up about 55 percent of the map unit; Vinton soils make up 30 percent. The Anthony soils are similar to the Vinton soils, but the Anthony soils are finer textured below the surface layer.

Included in mapping, and making up about 15 percent of the map unit, are areas of Anapra clay loam and Anthony-Vinton loams. Also included are areas of Anthony and Vinton soils that are not protected by levees and are susceptible to flooding. In these areas the soils are used only for grazing, recreation, and wildlife habitat.

The Anthony soils are deep and well drained. They formed in alluvium. Typically the surface layer is brown

clay loam about 15 inches thick. The underlying material, to a depth of 29 inches, is pale brown loamy very fine sand. Below that, to a depth of 60 inches or more, it is very pale brown fine sandy loam. This layer is stratified with thin layers of soil material that range from silt loam to loamy sand.

Permeability of the Anthony soils is moderately rapid. The depth of the root zone is 60 inches or more, and the available water capacity is moderate. Surface runoff is medium, and the water erosion hazard is slight. The soil blowing hazard is high.

The Vinton soils are deep and well drained. They formed in mixed alluvium. Typically, the surface layer is brown clay loam about 15 inches thick. The underlying material, to a depth of 50 inches, is brown loamy sand. Below that, to a depth of 60 inches, it is pale brown loamy sand. This layer is stratified with thin layers of very fine sandy loam and fine sand.

Permeability of the Vinton soils is moderately rapid. The depth of the root zone is 60 inches or more, and the available water capacity is moderate. Surface runoff is slow, and the water erosion hazard is slight. The soil blowing hazard is high.

If irrigated, these soils are suited to small grains, cotton, grain sorghum, legumes, grasses, vegetables, and nut crops. The primary crops are alfalfa hay, cotton, and small grains.

Planting crops that produce large amounts of residue and returning the residue to the soil or growing grasses and legumes in rotation helps control soil blowing and maintain the physical condition of the soil. Fertilization and improved water management practices help maintain or increase yields. All crops except legumes respond to nitrogen fertilizers. Legumes respond to phosphate fertilizers. Irrigation water can be applied efficiently if properly designed surface, drip, or sprinkler irrigation systems are installed. Rotation grazing increases yields and the quality of pasture. Timely harvesting improves the quality of crops.

If irrigated, these soils have good potential for windbreaks. Arizona cypress, Rocky Mountain juniper, green ash, cottonwood, Siberian elm, and Russian-olive are suitable trees; skunkbush sumac, pyracantha, oriental arborvitae, and American plum are suitable shrubs. Special treatment to overcome specific soil conditions may be needed by other species.

As a result of rapid urban expansion in the Mesilla Valley, some areas of these soils are used for urban development. These soils have only slight limitations for most types of urban and recreation development.

At—Armijo loam. This is a deep, well drained, nearly level soil that formed in alluvium on the flood plain of the Rio Grande. Elevation ranges from 3,700 to 4,120 feet. Areas of this soil have been leveled for irrigated crops and are protected from floodwater of the Rio Grande by dams and levees. The average annual precipitation is 8 inches, the average annual air temperature is 60 degrees F, and the average frost-free period is 200 days.

Included in mapping are small areas of Armijo clay loam and Armijo clay, and Belen, Glendale, and Anapra soils. The included soils make up 15 percent of the map unit; the area of each inclusion is generally less than one acre.

Typically, the surface layer is pinkish gray loam about 10 inches thick. The underlying material, to a depth of 52 inches, is reddish brown clay and clay loam. Below that, to a depth of 60 inches, it is loamy sand.

Permeability is very slow. The depth of the root zone is 60 inches or more, but the shrinking and swelling of the soil prunes and flattens roots. The available water capacity is high. The organic matter content is low in the surface layer. Surface runoff is very slow, and the water erosion hazard is slight. The soil blowing hazard is high.

If irrigated, this soil is suited to small grains, cotton, grain sorghum, legumes, and grasses. It is used primarily for alfalfa hay, improved pasture, and small grains. The major limitations are the very slow permeability and the clayey part of the underlying material, which impedes root growth.

Planting crops that produce large amounts of residue and returning the residue to the soil or growing grasses and legumes in rotation helps control soil blowing and maintain the physical condition of the soil. Fertilization and improved water management practices help maintain or increase yields. All crops except legumes generally respond to nitrogen fertilizers. Legumes respond to phosphate fertilizers. Irrigation water can be applied efficiently if properly designed surface or drip irrigation systems are installed. Rotation grazing increases yields and the quality of pasture. Timely harvesting improves the quality of crops.

If irrigated, this soil has fair potential for windbreaks. Arizona cypress, Rocky Mountain juniper, green ash, cottonwood, Siberian elm, and Russian-olive are suitable trees; skunkbush sumac, pyracantha, oriental arborvitae, and American plum are suitable shrubs. Special treatment to overcome specific soil conditions may be needed for other species.

As a result of rapid urban expansion in the Mesilla Valley, some areas of this Armijo soil are used for urban development. The shrink-swell potential, low strength, and very slow permeability severely limit the use of this soil for most types of urban development. Shrink-swell and low strength can be overcome by good design and careful installation procedures. The very slow permeability limits the use of this soil for septic tank absorption fields, but this limitation can be overcome by increasing the size of the absorption field. The very slow permeability is a moderate limitation for some recreation uses.

Aw—Armijo clay loam. This is a deep, well drained, nearly level soil that formed in alluvium on the flood plain of the Rio Grande. Elevation ranges from 3,700 to 4,120 feet. Areas of this soil have been leveled for irrigated cropland and are protected from floodwater of the Rio Grande by dams and levees. The average annual pre-

cipitation is 8 inches, the average annual air temperature is 60 degrees F, and the average frost-free period is 200 days.

Included in mapping are small areas of Armijo clay and Belen, Glendale, and Anapra soils and areas of saline- and sodium-affected Armijo clay loam. Also included are areas of Armijo clay loam that are not protected by levees and are susceptible to flooding. In these areas the soil is used only for grazing, recreation, and wildlife habitat. The included soils make up 15 percent of the map unit; individual areas of the included soils are generally less than 1 acre in size.

Typically, the surface layer is brown clay loam about 15 inches thick. The underlying material, to a depth of 42 inches, is brown clay, pinkish gray silty clay loam, and silty clay. Below that, to a depth of 60 inches, it is pinkish gray very fine sandy loam.

Ax—Armijo clay. This is a deep, well drained, nearly level soil that formed in alluvium on the flood plain of the Rio Grande. Elevation ranges from 3,700 to 4,120 feet. Areas of this soil have been leveled for use as irrigated cropland and are protected from floodwater of the Rio Grande by dams and levees. The average annual precipitation is 8 inches, the average annual air temperature is 60 degrees F, and the average frost-free period is 200 days.

Included in mapping are small areas of Armijo clay loam and Armijo loam and areas of Belen, Glendale, and Anapra soils. Also included are some areas of soils that are 60 to 75 percent clay in the upper part of the profile. The included soils make up 15 percent of the map unit; the area of each included soil is generally less than 1 acre in size.

Typically, the surface layer is light brownish gray clay about 12 inches thick. The underlying material is pinkish gray clay to a depth of 60 inches.

Permeability is very slow. The depth of the root zone is 60 inches or more, but shrinking and swelling of the soil prunes and flattens roots. The available water capacity is high. The organic matter content is low in the surface layer. Surface runoff is very slow, and the water erosion hazard is slight. The soil blowing hazard is moderate.

If irrigated, this soil is suited to small grains, cotton, grain sorghum, legumes, and grasses. It is used primarily for improved pasture and small grains. The major limitations are the very slow permeability, the clay surface layer, and an unfavorable root zone.

Planting crops that produce a large amount of residue and returning the residue to the soil annually or growing grasses and legumes helps control soil blowing and maintain the physical condition of the soil. Fertilization and improved water management practices help maintain or increase yields. All crops except legumes generally respond to nitrogen fertilizers. Legumes respond to phosphate fertilizers. Irrigation water can be applied if properly designed surface irrigation systems are installed. Rotation grazing increases yields and the quality of pasture. Timely harvesting improves the quality of crops.

If irrigated, this soil has fair potential for windbreaks. Arizona cypress, Rocky Mountain juniper, green ash, cottonwood, Siberian elm, and Russian-olive are suitable trees; and skunkbush sumac, pyracantha, oriental arborvitae, and American plum are suitable shrubs. Special treatment to overcome specific soil conditions may be needed for other species.

As a result of rapid urban expansion in the Mesilla Valley, some areas of this Armijo soil are used for urban development. This soil has severe limitations for most types of urban and recreation development. Shrinking and swelling and the low strength of the soil can be overcome by good design and careful installation procedures. The very slow permeability is a limitation for septic tank absorption fields, but this limitation can be overcome by increasing the size of the absorption field.

Be—Belen loam. This is a deep, well drained, nearly level soil that formed in alluvium on the flood plain of the Rio Grande. Elevation ranges from 3,700 to 4,120 feet. Areas of this soil have been leveled for use as irrigated cropland and are protected from floodwaters of the Rio Grande by dams and levees. The average annual precipitation is 8 inches, the average annual air temperature is 60 degrees F, and the average frost-free period is 200 days.

Included in mapping are small areas of Belen clay, Belen clay loam, and Anapra soils.

Typically, the surface layer is brown loam about 12 inches thick. The underlying material to a depth of 24 inches is brown clay. Below that, to a depth of 60 inches, it is light yellowish brown silt loam.

Permeability is slow to a depth of about 24 inches and moderate below that depth. The root zone is 60 inches deep. The available water capacity is high. The organic matter content is low in the surface layer. Surface runoff is slow. Water erosion is a slight hazard, and soil blowing is a moderate hazard.

If irrigated, this soil is suited to small grains, cotton, grain sorghum, legumes, grasses, and vegetables. The primary crops are alfalfa hay, cotton, and small grains. The major limitations are slow permeability and clayey underlying material, which impedes root growth.

Planting crops that produce large amounts of residue and returning the residue to the soil or growing grasses and legumes in rotation helps control soil blowing and maintain the physical condition of the soil. Fertilization and improved water management practices help maintain or increase yields. All crops except legumes generally respond to nitrogen fertilizers. Legumes respond to phosphate fertilizers. Irrigation water can be applied efficiently if properly designed surface, drip, or sprinkler irrigation systems are installed. Rotation grazing increases yields and the quality of pasture. Timely harvesting improves the quality of crops.

If irrigated, this soil has good potential for windbreaks. Arizona cypress, Rocky Mountain juniper, green ash, cottonwood, Siberian elm, and Russian-olive are suitable trees; and skunkbush sumac, pyracantha, oriental arborvitae, and American plum are suitable shrubs. Special treatment to overcome specific soil conditions may be needed for other species.

As a result of rapid urban expansion in the Mesilla Valley, some areas of this Belen soil are used for urban development. This soil has severe limitations for most types of urban development, but it is suited to most recreation uses. The shrink-swell potential, low strength, and slow permeability are the primary limitations. Shrinking and swelling and low strength can be overcome by good design and careful installation procedures. The slow permeability is a limitation for septic tank absorption fields, but this limitation can be overcome by increasing the size of the absorption field or by using the moderately permeable underlying material as the absorption field.

Bf—Belen clay loam. This is a deep, well drained, nearly level soil that formed in alluvium on the flood plain of the Rio Grande. Elevation ranges from 3,700 to 4,120 feet. Areas of this soil have been leveled for use as irrigated cropland and are protected from floodwaters of the Rio Grande by dams and levees. The average annual precipitation is 8 inches, the average annual air temperature is 60 degress F, and the average frost-free period is 200 days.

Included in mapping are small areas of Belen clay, Belen loam, and Anapra soils. Also included are areas of Belen clay loam that are along the Rio Grande and are not protected by levees. They are susceptible to flooding. These areas are used only for grazing, recreation, and wildlife habitat. The included soils make up 15 percent of the map unit; the areas of each included soil are generally less than 1 acre in size.

Typically, the surface layer is pale brown clay loam about 11 inches thick. The underlying material, to a depth of 26 inches, is pale brown silty clay. Below that, to a depth of 60 inches, it is light brown very fine sandy loam and very pale brown very fine sand.

Permeability is slow to a depth of 26 inches and moderate below that. The depth of the root zone is 60 inches or more. The available water capacity is high. The organic matter content is low in the surface layer. Surface runoff is slow, and the water erosion hazard is slight. The soil blowing hazard is moderate.

If irrigated, this soil is suited to small grains, cotton, grain sorghum, legumes, and grasses. The primary crops are alfalfa hay, cotton, and small grains. The major limitations are slow permeability and the clayey underlying material, which impedes root growth.

Planting crops that produce large amounts of residue and returning the residue to the soil annually or growing grasses and legumes helps control soil blowing and maintain the physical condition of the soil. Fertilization and improved water management practices help maintain or increase yields. All crops except legumes generally respond to nitrogen fertilizers. Legumes respond to phosphate fertilizers. Irrigation water can be applied efficiently if properly designed surface irrigation systems are installed. Rotation grazing increases yields and the quality of pasture. Timely harvesting improves the quality of crops.

If irrigated, this soil has fair potential for windbreaks. Arizona crypress, Rocky Mountain juniper, green ash, cottonwood, Siberian elm, and Russian-olive are suitable trees; and skunkbush sumac, pyracantha, oriental arborvitae, and American plum are suitable shrubs. Special treatment to overcome specific soil conditions may be needed for other species.

As a result of rapid urban expansion in the Mesilla Valley, some areas of this Belen soil are used for urban development. This soil has severe limitations for most types of urban development and moderate limitations for recreation development. The shrink-swell potential, low strength, and slow permeability are the primary limitations. Shrink-swell potential and low strength can be overcome by good design and careful installation procedures. The slow permeability is a limitation for septic tank absorption fields, but this limitation can be overcome by increasing the size of the absorption field or by using the moderately permeable underlying material as the absorption field.

Bg—Belen clay. This is a deep, well drained, nearly level soil that formed in clayey alluvium on the flood plain of the Rio Grande. Elevation ranges from 3,700 to 4,120 feet. Areas of this soil have been leveled for use as irrigated cropland and are protected from floodwaters of the Rio Grande by dams and levees. The average annual precipitation is 8 inches, the average annual air temperature is 60 degrees F, and the average frost-free period is 200 days.

Included in mapping are small areas of Belen clay loam and Armijo, Anapra and Glendale soils. Also included are areas of Belen clay that are not protected by levees and are susceptible to flooding. In these areas the soil is used only for grazing, recreation, and wildlife habitat. The included soils make up 15 percent of the map unit; the area of each inclusion is generally less than 1 acre.

Typically, the surface layer is brown clay about 11 inches thick. The underlying material, to a depth of 30 inches, is brown and pinkish gray clay and silty clay loam. Below that, to a depth of 60 inches, it is light yellowish brown and pale brown very fine sandy loam.

Permeability is slow to a depth of 30 inches, moderate at a depth of 30 to 40 inches, and rapid below a depth of 40 inches. The depth of the root zone is 60 inches or more. The available water capacity is high. The organic matter content is low in the surface layer. Surface runoff is slow, and the water erosion hazard is slight. The soil blowing hazard is moderate.

If irrigated, this soil is suited to small grains, cotton, grain sorghum, legumes, and grasses. It is primarily used

for alfalfa hay, improved pasture, and small grains. The major limitations are slow permeability, slow water intake, and an unfavorable root zone.

Planting crops that produce large amounts of residue and returning the residue to the soil annually or growing grasses and legumes helps control soil blowing and maintain the physical condition of the soil. Fertilization and improved water management practices help maintain or increase yields. All crops except legumes generally respond to nitrogen fertilizers. Legumes respond to phosphate fertilizers. Irrigation water can be applied efficiently if properly designed surface irrigation systems are installed. Rotation grazing increases yields and the quality of pasture. Timely harvesting improves the quality of crops.

If irrigated, this soil has fair potential for windbreaks. Arizona cypress, Rocky Mountain juniper, green ash, cottonwood, Siberian elm, and Russian-olive are suitable trees; and skunkbush sumac, pyracantha, oriental arborvitae, and American plum are suitable shrubs. Special treatment to overcome specific soil conditions may be needed for other species.

As a result of rapid urban expansion in the Mesilla Valley, some areas of this Belen soil are used for urban development. This soil has severe limitations for most types of urban development and for recreation uses. The shrink-swell potential, low strength, and slow permeability are the primary limitations. Shrink-swell potential and low strength can be overcome by good design and careful installation procedures. The slow permeability is a limitation for septic tank absorption fields, but this limitation can be overcome by increasing the size of the absorption field or by using the moderately permeable underlying material as the absorption field.

BH—Belen Variant soils. These soils are nearly level and are on the flood plain of the Rio Grande at an elevation of 3,700 to 4,100 feet. Areas are 10 to 80 acres in size and are irregularly shaped. The average annual precipitation is 8 inches, the average annual air temperature is 60 degrees F, and the average frost-free period is 200 days. Areas of this unit consist of Belen Variant clay, 0 to 1 percent slopes, or similar soils that have a water table at depths between 12 and 36 inches, or both. These soils are moderately saline-affected.

Included in mapping are areas of soils that are coarse textured. Also included are areas of Belen Variant soils that are not protected by levees and are susceptible to flooding. In these areas the soils are used only for grazing, recreation and wildlife habitat.

Belen Variant soils are deep and somewhat poorly drained. They formed in alluvium. Typically the surface layer is brown silty clay and clay 14 inches thick. The underlying material is light brownish gray silty clay to a depth of 21 inches and pale brown very fine sandy loam to a depth of 32 inches. Below that, to a depth of 60 inches, it is very pale brown very fine sand.

Permeability is very slow. The root zone is 12 to 36 inches deep. Surface runoff is slow, and the water erosion hazard is slight. The soil blowing hazard is moderate. The water table is at a depth of 12 to 36 inches.

The potential plant community includes alkali sacaton, giant sacaton, inland saltgrass, vine-mesquite, tobosa, and seepwillow.

Fencing pastures to separate them from adjoining uplands and the use of rotation-deferred grazing are desirable management practices.

These soils are susceptible to encroachment by saltcedar and other invaders. Mechanical control of invaders may be limited by wetness, and chemical control may be limited if wildlife and desirable riparian vegetation are present. Limitations for installing water pipelines and fences for livestock are not severe.

If irrigated, these soils are suited to small grains, grain sorghum, legumes, and grasses. They are used primarily for alfalfa hay, improved pasture, and small grains. The major limitations are very slow permeability, moderate depth to the water table, and moderate salinity. If these soils are used for cultivated crops, the soil blowing hazard is moderate.

Planting crops that produce large amounts of residue and returning the residue to the soil annually or growing grasses and legumes helps control soil blowing and maintain the physical condition of the soil. Fertilization and improved water management practices help maintain or increase yields. All crops except legumes generally respond to nitrogen fertilizers. Legumes respond to phosphate fertilizers. Irrigation water can be applied efficiently if properly designed surface irrigation systems are installed. Rotation grazing increases yields and the quality of pasture. Timely harvesting improves the quality of crops.

If irrigated, these soils have very low potential for windbreaks because of wetness, flooding, and very slow permeability. Onsite investigation is necessary to determine what vegetation, if any, can be grown. Special site preparations may be necessary for some species.

These soils have severe limitations for most urban uses and moderate limitations for recreation uses because of wetness, very slow permeability, and shrink-swell potential. Installing drains and lowering and stabilizing the water table can help overcome most limitations. However, in most areas, these soils have no drainage outlets.

BJ—Berino-Bucklebar association. This association consists of very gently sloping to gently sloping soils on broad fans. Elevation ranges from 4,000 to 5,000 feet. The average annual precipitation is 8 inches, the average annual air temperature is 62 degress F, and the average frost-free period is 230 days.

This association is about 35 percent Berino loamy fine sand, 1 to 5 percent slopes; 25 percent Bucklebar sandy loam, 1 to 5 percent slopes; and 25 percent Dona Ana fine sandy loam, 1 to 5 percent slopes.

Included in mapping are areas of Berino soils that have a surface layer of loamy fine sand and areas of

Pintura, Pajarito, and Onite soils. These included soils make up about 15 percent of the total acreage.

The Berino soil is deep and well drained. It formed in alluvium, from mixed sources, that has been modified by wind; it is on fans and piedmont slopes and in slight depressions in broad basins. Typically, the surface layer is brown loamy fine sand about 4 inches thick. The subsoil is reddish brown sandy loam and yellowish red sandy clay loam about 31 inches thick. The substratum is pink sandy clay loam to a depth of 60 inches or more.

Permeability of the Berino soil is moderate. The depth of the root zone is as much as 60 inches. The available water capacity is high. Surface runoff is very slow, and the water erosion hazard is moderate. The soil blowing hazard is very high.

The Bucklebar soil is deep and well drained. It formed in mixed alluvium that has been modified by wind. Typically, the surface layer is brown sandy loam about 2 inches thick. The subsoil is brown and reddish brown, heavy sandy loam and sandy clay loam about 23 inches thick. The substratum is light brown loam and silty clay loam to a depth of 60 inches or more.

Permeability of the Bucklebar soil is moderate. The depth of the root zone is 60 inches or more. The available water capacity is high. Surface runoff is medium, and the water erosion hazard is moderate. The soil blowing hazard is high.

The Dona Ana soil is deep and well drained. It formed in mixed alluvium on fans and piedmont slopes. Typically, the surface layer is light brown fine sandy loam about 5 inches thick. The substratum is pink sandy clay loam about 41 inches thick.

Permeability of the Dona Ana soil is moderate. The depth of the root zone is 60 inches or more. The available water capacity is high. Surface runoff is medium, and the water erosion hazard is moderate. The soil blowing hazard is high.

The soils in this association are suited to irrigated crops but are used mainly for grazing and wildlife habitat.

The potential plant community consists primarily of black grama, mesa dropseed, sand dropseed, and threeawn. A significant amount of seasonal forbs grows on these soils in certain years.

Range seeding is generally impractical because of low rainfall. Mesquite can be effectively controlled through the use of chemicals and it can be removed by hand grubbing. Mechanical removal is generally not recommended.

BK—Berino-Dona Ana association. This association consists of very gently sloping to gently sloping soils on broad fans. Elevation ranges from 4,000 to 5,000 feet. The average annual precipitation is 8 inches, the average annual air temperature is 62 degrees F, and the average frost-free period is 220 days.

This association is about 50 percent Berino fine sandy loam, 1 to 5 percent slopes; and 30 percent Dona Ana fine sandy loam, 1 to 5 percent slopes.

Included in mapping are areas of Reagan, Stellar, Bucklebar, Cacique, and Simona soils. These inclusions make up about 20 percent of the map unit.

The Berino soil is deep and well drained. It formed in alluvium modified by wind on sandy plains and fans. Typically, the surface layer is reddish brown fine sandy loam about 5 inches thick. The subsoil is reddish brown to yellowish red sandy clay loam about 13 inches thick. The substratum is pink and light brown sandy loam about 42 inches thick.

Permeability of the Berino soil is moderate. The depth of the root zone is 60 inches or more. The available water capacity is high. Surface runoff is very slow, and the water erosion hazard is moderate. The soil blowing hazard is very high.

The Dona Ana soil is deep and well drained. It formed in alluvium on fans. Typically, the surface layer is reddish brown fine sandy loam about 8 inches thick. The subsoil is reddish brown sandy clay loam about 14 inches thick. The substratum is pinkish white and light reddish brown sandy loam and sandy clay loam to a depth of 60 inches or more.

Permeability of the Dona Ana soil is moderate. The depth of the root zone is 60 inches or more. The available water capacity is high. Surface runoff is medium, and the water erosion hazard is moderate. The soil blowing hazard is high.

The Berino and Dona Ana soils are suited to irrigated crops, but are used mainly for grazing and wildlife habitat.

The potential plant community includes black grama, mesa dropseed, sand dropseed, and threeawn. A significant amount of seasonal forbs grows on these soils in certain years.

Range seeding is generally impractical because of low rainfall. Mesquite can be effectively controlled through the use of chemicals, and it can be removed by hand grubbing. Mechanical removal is generally not recommended.

BL—Berino-Pintura complex. This complex consists of very gently sloping to gently sloping soils on broad fans. Elevation ranges from 4,000 to 5,000 feet. The average annual precipitation is 8 inches, the average annual air temperature is 62 degrees F, and the average frost-free period is 200 days.

This complex is about 50 percent Berino fine sandy loam, 1 to 5 percent slopes; and 25 percent Pintura loamy fine sand, 1 to 5 percent slopes. Included in mapping, and making up about 25 percent of the map unit, are areas of Dona Ana, Bucklebar, Onite, and Pajarito soils.

The Berino soil is deep and well drained. It formed between dunes in wind reworked alluvium. Typically, the surface layer is light reddish brown fine sandy loam about 8 inches thick. The subsoil is yellowish red sandy clay loam about 20 inches thick. The substratum is light reddish brown sandy loam to a depth of 60 inches or more.

Permeability of the Berino soil is moderate. The depth of the root zone is 60 inches or more. The available water capacity is high. Surface runoff is very slow, and the water erosion hazard is moderate. The soil blowing hazard is high.

The Pintura soil is deep and somewhat excessively drained. It formed on dunes in eolian material. Typically, the soil material is light brown loamy fine sand to a depth of 60 inches or more.

Permeability of the Pintura soil is rapid. The depth of the root zone is 60 inches or more. The available water capacity is low. Surface runoff is very slow, and the water erosion hazard is slight. The soil blowing hazard is very high.

The Berino soil is suited to irrigated crops but is used mainly for grazing and wildlife habitat. The Pintura soil is poorly suited to irrigated crops because of the low available water capacity.

The potential plant community on the Berino soil includes black grama, mesa dropseed, sand dropseed, and threeawn. The potential plant community on the Pintura soil includes mesa dropseed, giant dropseed, bush muhly, sand sagebrush, and fourwing saltbush. A significant amount of seasonal forbs grows on these soils.

Range seeding is generally impractical because of low rainfall. Mesquite can be effectively controlled through the use of chemicals, and it can be removed by hand grubbing. Mechanical removal is generally not recommended.

Bm—Bluepoint loamy sand, 1 to 5 percent slopes. This soil is deep, somewhat excessively drained, and very gently sloping to gently sloping. It formed in sandy alluvium that has been modified by wind on fans, terraces, and ridges along the Rio Grande Valley (fig. 1). Elevation ranges from 3,720 to 4,000 feet. The average annual precipitation is 8 inches, the average annual air temperature is 60 degrees F, and the average frost-free period is 200 days.

Included in mapping are small areas of Bluepoint soils on higher slopes; some wind-hummocky areas; areas of Canutio, Caliza, and Arizo soils and Riverwash; and areas of similar soils that are 15 to 35 percent well-rounded pebbles and are adjacent to toeslopes of higher ridges. The included soils and Riverwash make up 25 percent of the map unit.

Typically, the soil is light brown loamy sand to a depth of 60 inches or more. Permeability is rapid. The depth of the root zone is 60 inches or more. The available water capacity is low. The organic matter content is low in the surface layer. Surface runoff is very slow. The water erosion hazard is slight, and the soil blowing hazard is very high.

If irrigated, this soil is suited to grain sorghum, legumes, and grasses. It is used primarily for alfalfa hay, improved pasture, and grain sorghum. The major limitations are the low available water capacity and rapid permeability.

Planting crops that produce a large amount of residue and returning this residue to the soil annually or growing grasses and legumes helps control soil blowing and maintain the physical condition of the soil. Fertilization and improved water management practices help maintain or increase yields. All crops except legumes generally respond to nitrogen fertilizers. Legumes respond to phosphate fertilizers. Irrigation water can be applied efficiently if properly designed surface, drip, or sprinkler irrigation systems are installed. Rotation grazing increases the yield and the quality of pasture grasses. Timely harvesting improves the quality of crops.

If irrigated, this soil has good potential for windbreaks. Arizona cypress, Rocky Mountain juniper, green ash, cottonwood, Siberian elm, and Russian-olive are suitable trees; and skunkbush sumac, pyracantha, oriental arborvitae, and American plum are suitable shrubs. Special treatment to overcome specific soil conditions may be needed for other species.

As a result of rapid urban expansion in the Mesilla Valley, some areas of this Bluepoint soil are used for urban development. The sandy texture limits the use of this soil for use as construction and recreation sites. The use of retaining walls for stability can prevent the walls of cuts from caving. The sandy texture limits trafficability, but this limitation can be overcome by adding a layer of gravel and finer textured material. There are limitations to the growth of lawn grasses, but these limitations can be overcome by adding finer textured material or by adding manure to increase the content of organic matter in the surface soils.

Bn—Bluepoint loamy sand, 5 to 15 percent slopes. This soil is deep, somewhat excessively drained, and gently sloping to moderately sloping. It formed in sandy alluvium that has been modified by wind on fans, terraces, and ridges along the upper margins of the Rio Grande Valley. Elevation ranges from 3,720 to 4,300 feet. The average annual precipitation is 8 inches, the average annual air temperature is 60 degrees F, and the average frost-free period is 200 days.

Included in mapping are small areas of Bluepoint soils on lower slopes; some wind-hummocky areas; areas of Canutio, Caliza, and Arizo soils and Riverwash; areas of similar soils that are 15 to 35 percent well-rounded pebbles and are adjacent to toeslopes of higher ridges; and sandstone Rock outcrop. The included soils and miscellaneous areas make up 25 percent of the map unit.

Typically, the surface layer is light brown loamy sand to a depth of 18 inches. The underlying material is light brown loamy fine sand to a depth of 60 inches or more.

Permeability is rapid. The depth of the root zone is 60 inches or more. The available water capacity is low. The organic matter content is low in the surface layer. Surface runoff is very slow. The water erosion hazard is slight, and the soil blowing hazard is very high.

This soil is not irrigated. It is used mainly for grazing, wildlife habitat, and urban development.

The potential plant community includes mesa dropseed, spike dropseed, giant dropseed, bush muhly, black grama, sand sagebrush, fourwing saltbush, and broom dalea. Forbs are an important component of the plant community.

Range seeding is generally impractical because of low rainfall. Mesquite infestations are common. The mesquite can be controlled chemically, and it can be removed by hand grubbing. Mechanical removal is generally not recommended. Wells, pipelines, troughs, and tanks are easily installed. However, this soil is very poorly suited to the construction of earthen ponds because of the sandy texture and the rapid permeability.

As a result of rapid urban expansion in the Mesilla Valley, some areas of this soil are used for urban development. The slope and sandy texture limit the use of this soil for most types of construction and recreation development. The slope limitation can be overcome by terracing and the use of retaining walls for slope stability. Soil blowing can be avoided by covering an area after it has been terraced. The sandy texture limits trafficability, but this limitation can be overcome by plating with gravel and other finer textured material. There are limitations to the growth of lawn grasses, but these limitations can be overcome by backfilling with finer textured material or by adding manure to increase the content of organic matter in the surface layer.

BO—Bluepoint loamy sand, 1 to 15 percent slopes. This soil is deep, somewhat excessively drained, and very gently sloping to moderately sloping. It formed in sandy alluvium that has been modified by wind; dunes have formed in many places on fans, terraces, and ridges along the upper margins of the Rio Grande Valley. Elevation ranges from 3,720 to 4,300 feet. Areas are dissected by many arroyos. The average annual precipitation is 8 inches, the average annual air temperature is 60 degrees F, and the average frost-free period is 200 days.

Included in mapping are small areas of Canutio, Caliza, and Arizo soils and Riverwash; areas of similar soils that are 15 to 35 percent well-rounded pebbles and are adjacent to toeslopes of higher ridges; and outcrops of sandstone and clay. The gravel content also increases near the edge of the valley and terminal fans of many intermittent streams. The included soils and miscellaneous areas make up 25 percent of the map unit.

Typically, the soil is light brown loamy sand to a depth of 60 inches or more.

Permeability is rapid. The depth of the root zone is 60 inches or more. The available water capacity is low. The organic matter content is low in the surface layer. Surface runoff is very slow. The water erosion hazard is slight, and the soil blowing hazard is very high.

This soil is not irrigated. It is used mainly for grazing, wildlife habitat, and urban development.

The potential plant community includes mesa dropseed, spike dropseed, giant dropseed, bush muhly, black grama, sand sagebrush, and fourwing saltbush. Forbs are an important component of the plant community.

Range seeding is generally impractical because of low rainfall. Mesquite infestations are common. The mesquite can be controlled chemically and can be removed by hand grubbing. Mechanical removal is generally not recommended. Wells, pipelines, troughs, and tanks are easily installed. However, this soil is very poorly suited to the construction of earthen ponds because of the sandy texture and the rapid permeability.

BP—Bluepoint-Caliza-Yturbide complex. This complex consists of hilly to very steep alluvial soils on fans and terraces along the Rio Grande Valley. Elevation ranges from 3,800 to 4,400 feet. These soils are severely dissected with gullies. The average annual precipitation is 8 inches, the average annual air temperature is 60 degrees F, and the average frost-free period is about 200 days.

Bluepoint loamy sand, 5 to 15 percent slopes, makes up about 25 percent of the complex; Caliza very gravelly sandy loam, 15 to 40 percent slopes, 25 percent; and Yturbide loamy sand, 1 to 8 percent slopes, 20 percent. These soils are similar to each other, but the Bluepoint soil on the average is less than 15 percent gravel. The Caliza soil is high in calcium carbonate and is 35 to 70 percent gravel. The Yturbide soil is 15 to 35 percent gravel. Included in mapping and making up about 30 percent of the complex are areas of Arizo, Canutio, Tencee, and Nickel soils; outcrops of clay and sandstone; and areas of dissected Haplargids.

The Bluepoint soil is deep and somewhat excessively drained. It formed in alluvium modified by wind on fans and terraces. Typically, the soil is light brown loamy sand to a depth of 60 inches or more.

Permeability of the Bluepoint soil is rapid. The depth of the root zone is 60 inches or more. The available water capacity is low. The organic matter content is low in the surface layer. Surface runoff is very slow. The water erosion hazard is slight, and the soil blowing hazard is very high.

The Caliza soil is deep and well drained. It formed in gravelly alluvium on fans or in river deposits of Pleistocene age. Typically, the surface layer is pinkish gray very gravelly sandy loam about 7 inches thick. The underlying material, to a depth of 12 inches, is pinkish white very gravelly sandy loam. Below that, to a depth of 60 inches, it is pinkish white and light brown very gravelly loamy sand and very gravelly sand.

Permeability of the Caliza soil is moderately rapid. The root zone is 60 inches deep. The available water capacity is very low. The organic matter content is low in the surface layer. Surface runoff is medium. The water erosion hazard is slight, and the soil blowing hazard is slight.

The Yturbide soil is deep and excessively drained. It formed in mixed alluvium along side and terminal fans along arroyos and old river deposits. Typically, the sur-

face layer is pinkish gray loamy sand 15 inches thick. The underlying material, to a depth of 26 inches, is light brown gravelly loamy sand. Below that, to a depth of 60 inches, it is light brown gravelly sand.

Permeability of the Yturbide soil is rapid. The root zone is 60 inches deep. The available water capacity is very low. The organic matter content is low in the surface layer. Surface runoff is very slow. The water erosion hazard is slight, and the soil blowing hazard is very high.

The soils in this map unit are not irrigated. They are used mainly for grazing and as wildlife habitat.

The potential plant community on the Bluepoint and Yturbide soils includes mesa dropseed, spike dropseed, giant dropseed, bush muhly, black grama, sand sagebrush, fourwing saltbush, and broom dalea. The potential plant community on the Caliza soil includes mesa dropseed, black grama, bush muhly, and creosotebush. Forbs are a significant component of the plant community.

Range seeding is generally impractical because of low rainfall. Mesquite infestations are common. The mesquite can be controlled chemically and can be removed by hand grubbing. Mechanical removal is generally not recommended. Wells, pipelines, troughs, and tanks generally are easily installed. However, these soils are very poorly suited to construction of earthen ponds because of the sandy texture and rapid permeability.

Br—Brazito loamy fine sand. This is a deep, well drained, nearly level soil that formed in mixed alluvium on the flood plain of the Rio Grande commonly near old or existent river channels. Elevation ranges from 3,700 to 4,120 feet. Areas of this soil have been leveled for irrigated cropland and are protected from floodwater of the Rio Grande by dams and levees. The average annual precipitation is 8 inches, the average annual air temperature is 60 degrees F, and the average frost-free period is 200 days.

Included in mapping are areas of similar soils that are moderately coarse textured in the upper part of the profile; areas of Brazito very fine sandy loams, thick surface; and areas of Vinton, Anthony, and Aqua soils. Also included are areas of Brazito loamy fine sand that are not protected by levees and are susceptible to flooding. In these areas the soil is used only for grazing, recreation, and wildlife habitat. The included soils make up 20 percent of the map unit; the area of each inclusion is generally less than 1 acre.

Typically, the surface layer is brown loamy fine sand about 5 inches thick. The underlying material is pale brown fine sand to a depth of 60 inches.

Permeability is rapid. The depth of the root zone is 10 to 24 inches, but it is limited for most plants by the very low available water capacity of the sandy underlying material. Surface runoff is very slow. The water erosion hazard is slight, and the soil blowing hazard is very high.

If irrigated, this soil is suited to grain sorghum, legumes, grasses, and nut crops. The primary crops are alfalfa hay and grain sorghum. The major limitations are rapid permeability, very low available water capacity, and an unfavorable rooting zone below a depth of 10 inches.

Planting crops that produce large amounts of residue and returning the residue to the soil annually or growing grasses and legumes helps control soil blowing and maintain the physical condition of the soil. Fertilization and improved water management practices help maintain or increase yields. All crops except legumes generally respond to nitrogen fertilizers. Legumes respond to phosphate fertilizers. Irrigation water can be applied efficiently if properly designed surface, drip, or sprinkler irrigation systems are installed. Rotation grazing increases yields and the quality of pasture. Timely harvesting improves the quality of crops.

If irrigated, this soil has fair potential for windbreaks. Arizona cypress, Rocky Mountain juniper, green ash, cottonwood, Siberian elm, and Russian-olive are suitable trees; skunkbush sumac, pyracantha, oriental arborvitae, and American plum are suitable shrubs. Special treatment to overcome specific soil conditions may be needed for other species.

As a result of rapid urban expansion in the Mesilla Valley, some areas of this soil are used for urban development. There are slight limitations for most types of urban development and moderate limitations for recreational development because of the sandy texture.

Bs—Brazito very fine sandy loam, thick surface. This is a deep, well drained, nearly level soil that formed in mixed alluvium on the flood plain of the Rio Grande, commonly near old or existent river channels. Elevation ranges from 3,700 to 4,120 feet. Areas of this soil have been leveled for irrigated cropland and are protected from floodwater of the Rio Grande by dams and levees. The average annual precipitation is 8 inches, the average annual air temperature is 60 degrees F, and the average frost-free period is 200 days.

Included in mapping are areas of similar soils that are moderately coarse textured in the upper part of the underlying material and areas of Brazito loamy fine sands and Vinton, Anthony and Aqua soils. Also included are areas of Brazito very fine sandy loam, thick surface, that are not protected by levees and are susceptible to flooding. In these areas the soil is used only for grazing, recreation, and wildlife habitat. The included soils make up 20 percent of the map unit; the area of each inclusion is generally less than 1 acre.

Typically, the surface layer is brown very fine sandy loam about 15 inches thick. The underlying material is very pale brown fine sand to a depth of 60 inches.

Permeability is rapid. The depth of the root zone is 10 to 24 inches, but it is limited for most plants by the very low available water capacity of the sandy underlying material. Surface runoff is slow. The water erosion hazard is slight, and the soil blowing hazard is high.

If irrigated, this soil is suited to grain sorghum, legumes, grasses, and nut crops. It is used primarily for

alfalfa hay, improved pasture, and grain sorghum. The major limitations are rapid permeability and the very low available water capacity of the underlying material, which limits the root zone mainly to a depth of less than 15 inches.

Planting crops that produce a large amount of residue and returning the residue to the soil annually or growing grasses and legumes helps control soil blowing and maintain the physical condition of the soil. Fertilization and improved water management practices help maintain or increase yields. All crops except legumes generally respond to nitrogen fertilizer. Legumes respond to phosphate fertilizer. Irrigation water can be applied efficiently if properly designed surface, drip, or sprinkler irrigation systems are installed. Rotation grazing increases the yield and quality of pasture grasses. Timely harvesting improves the quality of crops.

If irrigated, this soil has good potential for windbreaks. Arizona cypress, Rocky Mountain juniper, green ash, cottonwood, Siberian elm, and Russian-olive are suitable trees; skunkbush sumac, pyracantha, oriental arborvitae, and American plum are suitable shrubs. Special treatment to overcome specific soil conditions may be needed for other species.

As a result of rapid urban expansion in the Mesilla Valley, some areas of this soil are used for urban development. There is a slight limitation for most types of urban and recreation development.

CA—Cacique-Cruces association. This association consists of nearly level to gently sloping soils on basin floors. Elevation ranges from 4,000 to 5,000 feet. The average annual precipitation is 8 inches, the average annual air temperature is 62 degrees F, and the average frost-free period is 220 days.

This association is about 35 percent Cacique loamy sand, 0 to 3 percent slopes; 25 percent Cruces loamy sand, 0 to 5 percent slopes; and 20 percent Simona loamy sand, 0 to 5 percent slopes.

Included in mapping are areas of Berino, Bucklebar, Dona Ana, Pintura, Onite, and Pajarito soils. These inclusions make up about 20 percent of the map unit.

The Cacique soil is moderately deep, nearly level, and well drained. It formed in alluvium on basin floors. Typically, the surface layer is reddish brown loamy sand, about 2 inches thick. The subsoil is reddish brown sandy clay loam and sandy loam about 23 inches thick. Hard caliche is at a depth of 25 inches (fig. 2).

Permeability of the Cacique soil is moderate. The root zone is 20 to 40 inches deep. The available water capacity is low. Surface runoff is medium, and the water erosion hazard is moderate. The soil blowing hazard is very high.

The Cruces soil is shallow, nearly level, and well drained. It formed in gravelly sandy sediments on basin floors. Typically, the surface layer is reddish brown loamy sand about 2 inches thick. The subsoil is reddish brown and red fine sandy loam and sandy clay loam about 12 inches thick. The substratum is pinkish white and white laminar carbonate-cemented material.

Permeability of the Cruces soil is moderate. The root zone is 10 to 20 inches deep. The available water capacity is low. Surface runoff is medium, and the water erosion hazard is very high. The soil blowing hazard is very high.

The Simona soil is shallow, nearly level to gently sloping, and well drained. It formed in calcareous sandy sediment on plains, mesa tops, and low ridges. Typically, the surface layer is light brown loamy sand about 7 inches thick. The subsoil is brown sandy loam about 7 inches thick. The substratum is brown gravelly sandy loam about 4 inches thick over hard caliche. The caliche is pink, laminar carbonate-cemented material.

Permeability of the Simona soil is moderately rapid. The root zone is 7 to 20 inches deep. The available water capacity is very low. Surface runoff is slow, and the water erosion hazard is slight. The soil blowing hazard is very high.

These soils are poorly suited to irrigated crops. Cruces and Simona soils are too shallow and have low available water capacity. The Cacique soil also has low available water capacity.

The potential plant community on the Cruces and Simona soils includes black grama, mesa dropseed, sand dropseed, bush muhly, winterfat, and tobosa. The potential plant community on the Cacique soil includes black grama, mesa dropseed, sand dropseed, and broom snakeweed. Forbs are an important component of these plant communities.

Range seeding is generally impractical because of climatic limitations, mainly rainfall. Mesquite can be controlled chemically and can be removed by hand grubbing. Mechanical removal is generally not recommended. Livestock can be more effectively distributed if fences, wells, pipelines, troughs, and tanks are used. Earthen ponds are not practical for use on the shallow Cruces and Simona soils. Pipelines are difficult to install due to the depth to the cemented pan.

Cb—Canutio and Arizo gravelly sandy loams. These soils are very gently sloping to gently sloping. They are on fans, terraces, valley floors, and wide arroyos above the Rio Grande flood plain at an elevation of 3,800 to 4,400 feet. Areas are 20 to 350 acres in size. The average annual precipitation is 8 inches, the average annual air temperature is 60 degrees F, and the average frost-free period is 200 days.

Areas of this map unit consists of Canutio gravelly sandy loam, 1 to 5 percent slopes, or Arizo gravelly sandy loam, 1 to 5 percent slopes, or both.

Included in mapping are areas of Bluepoint and Yturbide soils and Riverwash. These inclusions make up 30 percent of the map unit.

The Canutio soil is deep and well drained. It formed in mixed alluvium on fans and terraces. Typically, the surface layer is light yellowish brown gravelly sandy loam 10

inches thick. The underlying material, to a depth of 20 inches, is pale brown very gravelly loamy sand. Below that, to a depth of 60 inches, it is pale brown very gravelly sandy loam and gravelly loamy sand.

Permeability of the Canutio soil is moderately rapid. The root zone is 60 inches deep. Surface runoff is rapid, and the water erosion hazard is high. The soil blowing hazard is moderate.

The Arizo soil is deep and excessively drained. It formed in mixed alluvium on valley floors and in wide arroyos. Typically, the surface layer is light brown gravelly sandy loam 15 inches thick. The underlying material is pink very gravelly sand to a depth of 60 inches.

Permeability of the Arizo soil is very rapid. The root zone is 60 inches deep. Surface runoff is very slow except during periods of convectional storms and when the runoff from higher lying soils collects on these soils. The water erosion hazard is high. The soil blowing hazard is moderate. This soil is commonly subject to brief periods of flooding during spring and summer.

These soils are used for rangeland and wildlife habitat.

The potential plant community includes mesa dropseed, black grama, bush muhly, and creosotebush. Forbs are a significant component of the plant community during some seasons.

These soils are poorly suited to mechanical range seeding because of low rainfall. Mesquite and possibly creosotebush can be controlled chemically; mechanical removal is generally not recommended. These soils are generally not suited to earthen ponds because of seepage.

CH—Cave-Harrisburg association. This association consists of gently undulating to undulating soils at an elevation of 4,000 to 5,000 feet. The average annual precipitation is 8 inches, the average annual air temperature is 62 degrees F, and the average frost-free period is 220 days.

This association is about 45 percent Cave gravelly sandy loam, 1 to 5 percent slopes, and 30 percent Harrisburg fine sandy loam, 1 to 5 percent slopes.

Included in mapping are areas of Wink, Simona, Pajarito, Cruces, and Cacique soils. These inclusions make up about 25 percent of the map unit.

The Cave soil is shallow and well drained. It formed in medium textured and moderately coarse textured, gravelly old valley fill over hard caliche on low hills and ridges. Typically, the surface layer is pale brown, gravelly sandy loam about 10 inches thick. The underlying material is very pale brown gravelly sandy loam about 6 inches thick over indurated caliche.

Permeability of the Cave soil is moderate. The root zone is 4 to 20 inches deep. The available water capacity is very low. Surface runoff is medium, and the water erosion is slight. The soil blowing hazard is moderate.

The Harrisburg soil is moderately deep and well drained. It formed in residuum of the eolian material derived from sandstone, volcanic ash, and shale. It is in slight depressions on mesas and ridge tops. Typically, the surface layer is light brown fine sandy loam about 3 inches thick. The underlying material is light reddish brown fine sandy loam and gravelly fine sandy loam about 21 inches thick over pinkish white hard caliche.

Permeability of the Harrisburg soil is moderately rapid to the hardpan. The root zone is 20 to 40 inches deep. The available water capacity is low. Surface runoff is slow, and the water erosion hazard is slight. The soil blowing hazard is moderate.

These soils are used mainly for grazing and as wildlife habitat.

The potential plant community on the Cave soil includes bush muhly, black grama, cane bluestem, creosotebush, tarbush, mariola, and winterfat. The potential plant community on the Harrisburg soil includes black grama, mesa dropseed, sand dropseed, threeawn, and yucca. In some seasons, forbs are significant components of these plant communities.

Accelerated erosion is possible if plant cover is significantly reduced. Grazing management should be designed to increase the vigor, production, and reproduction of such plants as black grama, bush muhly, fourwing saltbush, and winterfat. Continuous, year-long grazing commonly results in a deteriorated plant community, characterized on the Cave soil by a substantial increase in creosotebush and tarbush and on the Harrisburg soil by mesquite and broom snakeweed.

Mechanical range seeding is generally not feasible on these soils because of climatic limitations. Mechanical manipulations are not generally recommended. Pipelines and earthen ponds are difficult to install because of the depth to the cemented pan.

DR—Dona Ana-Reagan association. This association consists of gently undulating to undulating soils on broad fans. Elevation ranges from 4,000 to 5,000 feet. The average annual precipitation is 8 inches, the average annual air temperature is 62 degrees F, and the average frost-free period is 220 days.

This association is about 35 percent Dona Ana fine sandy loam, 1 to 5 percent slopes, and 35 percent Reagan loam, 1 to 3 percent slopes. The Dona Ana soil is on sloping alluvial fans. The Reagan soil is on nearly level to gently sloping plains and alluvial fans.

Included in mapping are areas of Wink, Berino, Pintura, and Stellar soils and similar soils in nearly level or slightly concave areas. These inclusions make up about 20 percent of the map unit.

The Dona Ana soil is deep and well drained. Typically, the surface layer is light brown fine sandy loam about 5 inches thick. The subsoil is light brown sandy clay loam about 14 inches thick. The substratum is pink sandy clay loam to a depth of 60 inches or more.

Permeability of the Dona Ana soil is moderate. The depth of the root zone is 60 inches or more. The available water capacity is high. Surface runoff is medium, and the water erosion hazard is moderate. The soil blowing hazard is high.

The Reagan soil is deep and well drained. It formed in alluvium. Typically, the surface layer is pinkish gray clay loam about 2 inches thick. The subsoil is light brown and brown clay loam and silty clay loam about 55 inches thick. The substratum is light brown sandy clay loam to a depth of 60 inches or more.

Permeability of the Reagan soil is moderate. The depth of the root zone is 60 inches or more. The available water capacity is high. Surface runoff is slow, and the water erosion hazard is moderate. The soil blowing hazard is slight.

These soils are suited to irrigated crops but are used mainly for grazing and as wildlife habitat.

The potential plant community on the Dona Ana soil includes black grama, mesa dropseed, sand dropseed, broom snakeweed, and fourwing saltbush. The potential plant community on the Reagan soil includes black grama, bush muhly, tobosa, sand dropseed, burrograss, threeawn, yucca, fourwing saltbush, and plains bristlegrass. Seasonal forbs are a significant component of these plant communities.

Range seeding is generally impractical because of low rainfall. Mesquite can be effectively controlled through the use of chemicals, and can be removed by hand grubbing. Mechanical removal is generally not recommended.

DS—Dumps. This miscellaneous area consists of waste rock, concrete slab waste, old highway black top material, and other solid waste materials that are piled 2 to 4 feet on different soils (fig. 3). Some areas have been leveled and are covered by soil material. In places, large voids in the waste material cause areas to subside. There are severe limitations for most types of urban and recreation development; however, special design and certain methods of construction can overcome most of the limitations. Some areas of this map unit are used as construction and recreation sites.

Ge—Glendale loam. This is a deep, well drained, nearly level soil that formed in mixed alluvium on the flood plains and low terraces of the Rio Grande. Elevation ranges from 3,700 to 4,120 feet. Areas of this soil have been leveled for irrigated cropland and are protected from floodwater of the Rio Grande by dams and levees. The average annual precipitation is 8 inches, the average annual air temperature is 60 degrees F, and the average frost-free period is 200 days.

Included in mapping are small areas of Glendale clay loam and Harkey and Anapra soils. Also included are areas of Glendale soils that are not protected by levees and are susceptible to flooding. In these areas the soils are used only for grazing, recreation, and wildlife habitat. The included soils make up 15 percent of the map unit; the area of each inclusion is generally less than 1 acre.

Typically, the surface layer is brown loam about 12 inches thick. The underlying material, to a depth of 40 inches, is pale brown and brown clay loam. Below that, to a depth of 60 inches, it is pale brown very fine sandy loam.

Permeability is moderately slow. The depth of the root zone is 60 inches or more. The available water capacity is very high. The organic matter content is low in the surface layer. Surface runoff is slow, and the water erosion hazard is slight. The soil blowing hazard is moderate.

If irrigated, this soil is suited to small grains, cotton, grain sorghum, legumes, grasses, vegetables, and nut crops. The primary crops are alfalfa hay, cotton, and small grains.

Planting crops that produce large amounts of residue and returning the residue to the soil or growing grasses and legumes in rotation helps control soil blowing and maintain the physical condition of the soil. Fertilization and improved water management practices help maintain or increase yields. All crops except legumes generally respond to nitrogen fertilizers. Legumes respond to phosphate fertilizers. Irrigation water can be applied efficiently if properly designed surface, drip, or sprinkler irrigation systems are installed. Rotation grazing increases yields and the quality of pasture. Timely harvesting improves the quality of crops.

If irrigated, this soil has good potential for windbreaks. Arizona cypress, Rocky Mountain juniper, green ash, cottonwood, Siberian elm, and Russian-olive are suitable trees; and skunkbush sumac, pyracantha, oriental arborvitae, and American plum are suitable shrubs. Special treatment to overcome specific soil conditions may be needed for other species.

As a result of rapid urban expansion in the Mesilla Valley, some areas of this Glendale soil are used for urban development. This soil has moderate limitations for most types of urban and recreation development. Low strength and moderate shrink-swell potential are limitations for urban development. These limitations can be overcome by good design and careful installation procedures. The moderately slow permeability is a limitation for septic tank absorption fields, but this limitation can be overcome by increasing the size of the absorption field.

Gf—Glendale clay loam. This is a deep, well drained, nearly level soil that formed in mixed alluvium on the flood plain of the Rio Grande. Elevation ranges from 3,700 to 4,120 feet. Areas of this map unit have been leveled for irrigated cropland and are protected from floodwater of the Rio Grande by dams and levees. The average annual precipitation is 8 inches, the average annual air temperature is 60 degrees F, and the average frost-free period is 200 days.

Included in mapping are small areas of Glendale loam and Anapra, Armijo, Belen, and Harkey soils. Also included are areas of Glendale soils that are not protected by levees and are susceptible to flooding. In these areas the soils are used only for grazing, recreation, and as wildlife habitat. The included soils make up 15 percent of the map unit; the area of each inclusion is generally less than 1 acre.

Typically, the surface layer is pale brown clay loam about 12 inches thick. The underlying material, to a depth of 40 inches, is light yellowish brown and pale brown clay loam. Below that, to a depth of 60 inches, it is pale brown very fine sandy loam.

Permeability is moderately slow. The depth of the root zone is 60 inches or more. The available water capacity is high. The organic matter content is low in the surface layer. Surface runoff is slow, and the water erosion hazard is slight. The soil blowing hazard is moderate.

If irrigated, this soil is suited to small grains, cotton, grain sorghum, legumes, grasses, vegetables, and nut crops. The primary crops are alfalfa hay, cotton, and small grains.

Planting crops that produce large amounts of residue and returning this residue to the soil or growing grasses and legumes in rotation helps control soil blowing and maintain the physical condition of the soil. Fertilization and improved water management practices help maintain or increase yields. All crops except legumes generally respond to nitrogen fertilizers. Legumes respond to phosphate fertilizers. Irrigation water can be applied efficiently if properly designed surface, drip, or sprinkler irrigation systems are installed. Rotation grazing increases yields and the quality of pasture. Timely harvesting improves the quality of crops.

If irrigated, this soil has good potential for windbreaks. Arizona cypress, Rocky Mountain juniper, green ash, cottonwood, Siberian elm, and Russian-olive are suitable trees; and skunkbush sumac, pyracantha, oriental arborvitae, and American plum are suitable shrubs. Special treatment to overcome specific soil conditions may be needed for other species.

As a result of rapid urban expansion in the Mesilla Valley, some areas of this Glendale soil are used for urban development. This soil has moderate limitations for most types of urban and recreation development. Low strength and moderate shrink-swell potential are limitations for urban development. These limitations can be overcome by good design and careful installation procedures. The moderately slow permeability is a limitation for septic tank absorption fields, but this limitation can be overcome by increasing the size of the absorption field.

Gg—Glendale clay loam, alkali. This is a deep, well drained, saline and alkali soil that formed in mixed alluvium on the flood plain of the Rio Grande. Elevation ranges from 3,700 to 4,120 feet. Areas of this soil have been leveled for irrigated cropland and are protected from floodwater of the Rio Grande by dams and levees. The source of sodium is irrigation water. The average annual precipitation is 8 inches, the average annual air temperature is 60 degrees F, and the average frost-free period is 200 days.

Included in mapping are small areas of Glendale loam that are sodium affected and areas of Anapra, Harkey, and Belen soils. The included soils make up 15 percent of the map unit; the area of each inclusion is generally less than 1 acre.

Typically, the surface layer is light brown clay loam about 12 inches thick. The underlying material, to a depth of 34 inches, is light reddish brown and reddish brown clay loam. Below that, to a depth of 60 inches, it is pale brown light clay loam.

Permeability is moderately slow. The depth of the root zone is 60 inches or more, but plant growth is severely limited by the high salinity and alkalinity. The available water capacity is high. The organic matter content is low in the surface layer. Surface runoff is slow, and the water erosion hazard is slight. The soil blowing hazard is high.

If irrigated, this soil is suited to small grains, grain sorghum, legumes, and grasses. It is used primarily for alfalfa hay, improved pasture, and small grains. The major limitations are moderately slow permeability and salinity and alkalinity.

Planting crops that produce large amounts of residue and returning the residue to the soil annually or growing grasses and legumes helps control soil blowing and maintain the physical condition of the soil. Fertilization and improved water management practices help maintain or increase yields. All crops except legumes generally respond to nitrogen fertilizers. Legumes respond to phosphate fertilizers. Irrigation water can be applied efficiently if properly designed surface irrigation systems are installed. Rotation grazing increases yields and the quality of pasture. Timely harvesting improves the quality of crops.

If irrigated, this soil has low potential for windbreaks because of alkali and saline conditions. Onsite investigations are necessary to determine what species, if any, can be grown. Special site preparations may be necessary for certain species.

As a result of rapid urban expansion in the Mesilla Valley, some areas of this Glendale soil are used for urban development. This soil has moderate to severe limitations for most types of urban and recreation development. Low strength and moderate shrink-swell potential are limitations for urban development. These limitations can be overcome by good design and careful installation procedures. The moderately slow permeability is a limitation for septic tank absorption fields, but this limitation can be overcome by increasing the size of the absorption field.

HD—Haplargids, dissected. The soils in this map unit are deep, well drained, and sloping to very steep. They formed in mixed alluvium along the terminal breaks of piedmont slopes and old fans at an elevation of 4,000 to 4,600 feet. The average annual precipitation is 8 inches, the average annual temperature is 60 degrees F, and the average frost-free period is 210 days. Areas are severely dissected by arroyos and gullies.

Included in mapping are small areas of Bluepoint, Yturbide, Nickel, Caliza, Pinaleno, and Nolam soils. These inclusions make up about 20 percent of the map unit.

No one profile is representative of this unit, but in one of the more common ones, the surface is light brown very gravelly sandy loam about 12 inches thick. The underlying material is light brown and light reddish brown sandy loam and loam to a depth of 76 inches.

Permeability is variable, but commonly it is moderate. The root zone is 60 inches deep. Surface runoff is rapid, and the water erosion hazard is high. Soil blowing hazard is moderate.

These soils are used as rangeland and wildlife habitat.

The potential plant community includes mesa dropseed, sand dropseed, black grama, bush muhly, fluffgrass, creosotebush, mesquite, yucca, threeawn, and broom snakeweed. Seasonal forbs are a significant component of the plant community.

Mechanical range seeding is impractical because of low rainfall. Mesquite, and possibly creosotebush, can be controlled chemically. Mechanical removal is not generally recommended. Effective distribution of livestock is difficult because steep slopes limit the installation of pipelines, troughs, tanks, earthen ponds, and wells.

Hf—Harkey fine sandy loam. This is a deep, well drained, nearly level soil that formed in alluvium on the flood plain of the Rio Grande. Elevation ranges from 3,700 to 4,120 feet. Areas of this soil have been leveled for irrigated cropland and are protected from floodwater of the Rio Grande by dams and levees. The average annual precipitation is 8 inches, the average annual temperature is 60 degrees F, and the average frost-free period is 200 days.

Included in mapping are small areas of Harkey loam and Harkey clay loam and areas of Glendale, Anthony, Agua, Vinton, and Brazito soils. Also included are areas of Harkey sandy loam that are not protected by levees and are susceptible to flooding. In these areas the soil is used only for grazing and recreation and as wildlife habitat. The included soils make up 15 percent of the map unit; the area of each inclusion is generally less than 1 acre.

Typically, the surface layer is brown fine sandy loam about 13 inches thick. The underlying material, to a depth of 56 inches, is stratified pale brown and very pale brown very fine sandy loam and silt loam. Below that, to a depth of 60 inches or more, it is pale brown fine sand.

Permeability is moderate. The depth of the root zone is 60 inches or more, and the available water capacity is high. The organic matter content is low in the surface layer. Surface runoff is slow, and the water erosion hazard is slight. The soil blowing hazard is high.

If irrigated, this soil is suited to small grains, cotton, grain sorghum, legumes, grasses, vegetables, and nut crops. The primary crops are alfalfa hay, cotton, and small grains.

Planting crops that produce large amounts of residue and returning this residue to the soil annually or growing grasses and legumes helps control soil blowing and maintain the physical condition of the soil. Fertilization and improved water management practices help maintain or increase yields. All crops except legumes generally respond to nitrogen fertilizers. Legumes respond to phosphate fertilizers. Irrigation water can be applied efficiently if properly designed surface, drip, or sprinkler irrigation systems are installed. Rotation grazing increases yields and the quality of pasture. Timely harvesting improves the quality of crops.

If irrigated, this soil has good potential for the establishment of windbreaks. Arizona cypress, Rocky Mountain juniper, green ash, cottonwood (cottonless), Siberian elm, and Russian-olive are suitable trees; and skunkbush sumac, pyracantha, oriental arborvitae, and American plum are suitable shrubs. Special treatment to overcome specific soil conditions may be needed for other species.

As a result of rapid urban expansion in the Mesilla Valley, some areas of this Harkey soil are used for urban development. This soil has moderate limitations for most types of urban development because of low strength. It has slight limitations for recreational uses. Low strength can be overcome by good design.

Hg—Harkey loam. This is a deep, well drained, nearly level soil that formed in alluvium on the flood plain of the Rio Grande. Elevation ranges from 3,700 to 4,120 feet. Areas of this map unit have been leveled for irrigated cropland, and now they are protected from floodwaters of the Rio Grande by dams and levees. The average annual precipitation is 8 inches, the average annual temperature is 60 degrees F, and the average frost-free period is 200 days.

Included in mapping are small areas of Harkey soils that have a surface layer of clay loam or fine sandy loam and areas of Glendale, Anthony, Vinton, Brazito, and Agua soils. Also included are areas of Harkey loam that are not protected by levees and are suscepible to flooding. In these areas the soil is used only for grazing and recreation and as wildlife habitat. The included soils make up 15 percent of the area; the area of each inclusion is less than 1 acre.

Typically, the surface layer is brown loam about 18 inches thick. The underlying material, to a depth of about 38 inches, is pale brown very fine sandy loam. Below that, to a depth of 60 inches, it is brown silt loam.

Permeability is moderate. The depth of the root zone is 60 inches or more. The available water capacity is high. The organic matter content is low in the surface layer. Surface runoff is slow, and the water erosion hazard is slight. The soil blowing hazard is high.

If irrigated, this soil is suited to small grains, cotton, grain sorghum, legumes, grasses, vegetables, and nut crops. The primary crops are alfalfa hay, cotton, and small grains.

Planting crops that produce large amounts of residue and returning this residue to the soil annually or growing grasses and legumes in rotation helps control soil blowing and maintain the physical condition of the soil. Fertilization and improved water management practices help

maintain or increase yields. All crops except legumes generally respond to nitrogen fertilizers. Legumes respond to phosphate fertilizers. Irrigation water can be applied efficiently if properly designed surface, drip, or sprinkler irrigation systems are installed. Rotation grazing increases yields and the quality of pasture. Timely harvesting improves the quality of crops.

If irrigated, this soil has good potential for windbreaks. Arizona cypress, Rocky Mountain juniper, green ash, cottonwood, Siberian elm, and Russian-olive are suitable trees; and skunkbush sumac, pyracantha, oriental arborvitae, and American plum are suitable shrubs. Special treatment to overcome specific soil conditions may be needed for other species.

As a result of urban expansion in the Mesilla Valley, some areas of this Harkey soil are used for urban development. This soil has moderate limitations for most types of urban development because of low strength. It has slight limitations for recreational uses. Low strength can be overcome by good design and careful installation procedures.

Hh—Harkey loam, saline-alkali. This is a deep, well drained, nearly level soil that formed in alluvium on the flood plain of the Rio Grande. Elevation ranges from 3,700 to 4,120 feet. Areas of this soil have been leveled for irrigated cropland and are protected from floodwater of the Rio Grande by dams and levees. The average annual precipitation is 8 inches, the average annual temperature is 60 degrees F, and the average frost-free period is 200 days. The main source of sodium is floodwater that swamps undrained areas of the lowlands.

Included in mapping are areas of Harkey loams, clay loams, and sandy loams and Glendale soils. The included soils make up 10 percent of the map unit; the area of each inclusion is generally less than 1 acre.

Typically, the surface layer is pale brown loam about 10 inches thick. The underlying material, to a depth of about 47 inches, is stratified light yellowish brown and pale brown very fine sandy loam. Below that, to a depth of 60 inches, it is pale brown loamy sand.

Permeability is moderate. The depth of the root zone is 60 inches or more, and the available water capacity is high. Surface runoff is slow, and the water erosion hazard is slight. The soil blowing hazard is high.

If irrigated, this soil is suited to small grains, cotton, grain sorghum, legumes, and grasses. The primary crops are alfalfa hay, cotton, and small grains. The major limitations are high salinity and alkalinity.

Planting crops that produce a large amount of residue and returning this residue to the soil annually or growing grasses and legumes helps to control soil blowing and to maintain the physical condition of the soil. Fertilization and improved water management practices help to maintain or increase yields. In general, all crops except legumes respond to nitrogen fertilizer. Legumes respond to phosphate fertilizer. Irrigation water can be applied efficiently if a properly designed surface irrigation system is installed. Rotation grazing increases the yield and quality of pasture grasses. Timely harvesting improves the quality of crops.

Even if irrigated, this soil has very low potential for windbreaks because of high salinity and alkalinity. Onsite investigation is necessary to determine what adapted species, if any, can be grown. Special site preparation may be needed for selected species.

As a result of rapid urban expansion in the Mesilla Valley, some areas of this Harkey soil are used for urban development. This soil has moderate limitations for most types of urban development because of low strength. Good design and careful installation procedures can help to overcome this limitation. This soil has slight limitations for recreation uses.

Hk—Harkey clay loam. This is a deep, well drained, nearly level soil that formed in alluvium on the flood plain of the Rio Grande. Elevation ranges from 3,700 to 4,120 feet. Areas of this soil have been leveled for irrigated cropland and are protected from floodwater of the Rio Grande by dams and levees. The average annual precipitation is 8 inches, the average annual temperature is 60 degrees F, and the frost-free period is 200 days.

Included in mapping are small areas of Harkey loam and Glendale, Agua, and Anthony soils. Also included are areas of Harkey clay loam that are not protected by levees and are susceptible to flooding. In these areas the soil is used only for grazing and recreation and as wildlife habitat. The included soils make up 15 percent of the map unit; the area of each inclusion is less than 1 acre.

Typically, the surface layer is pale brown clay loam about 12 inches thick. The underlying material is stratified pale brown and brown fine sandy loam and silt loam to a depth of 60 inches.

Permeability is moderate. The depth of the root zone is 60 inches or more, and the available water capacity is high. Surface runoff is slow, and the water erosion hazard is slight. The soil blowing hazard is high.

If irrigated, this soil is suited to small grains, cotton, grain sorghum, legumes, grasses, vegetables, and nut crops. The primary crops are alfalfa hay, cotton, and small grains.

Planting crops that produce large amounts of residue and returning this residue to the soil or growing grasses and legumes in rotation helps control soil blowing and maintain the physical condition of the soil. Fertilization and improved water management practices help maintain or increase yields. All crops except legumes generally respond to nitrogen fertilizers. Legumes respond to phosphate fertilizers. Irrigation water can be applied efficiently if properly designed surface, drip, or sprinkler irrigation systems are installed. Rotation grazing increases yields and the quality of pasture. Timely harvesting improves the quality of crops.

If irrigated, this soil has good potential for the establishment of windbreaks. Arizona cypress, Rocky Moun-

tain juniper, green ash, cottonwood, Siberian elm, and Russian-olive are suitable trees; and skunkbush sumac, pyracantha, oriental arborvitae, and American plum are suitable shrubs. Special treatment to overcome specific soil conditions may be needed for other species.

As a result of rapid urban expansion in the Mesilla Valley, some areas of this Harkey soil are used for urban development. This soil has moderate limitations for most types of urban development and slight limitations for recreation uses. Low strength and shrink-swell potential are limitations for these uses. These limitations can be overcome by good design and careful installation procedures.

MN—Masonfort-Nickel association. This association consists of undulating to moderately rolling soils. Elevation ranges from about 4,000 to 5,000 feet. The average annual precipitation is 9 inches, the average annual temperature is 62 degrees F, and the average frost-free period is 210 days.

This association is 40 percent Masonfort sandy loam, 3 to 15 percent slopes, and about 30 percent Nickel gravelly sandy loam, 3 to 15 percent slopes. The Masonfort soil is in all areas of the association. The Nickel soil generally is on the steeper side slopes.

Included in mapping are areas of similar soils that are moderately deep to fractured andesite. Also included are areas of soils that are more than 35 percent coarse fragments below a depth of 10 inches; some of these soils are shallow or moderately deep to the fractured andesite. Also included are areas of Berino, Dona Ana, and Mimbres soils, in drainageways that dissect the landscape; Upton soils; and Rock outcrop, at the top of ridges and on low terraces. These inclusions make up about 30 percent of the association.

The Masonfort soil is shallow and well drained. It formed in calcareous alluvium. Typically, the surface layer is brown sandy loam about 3 inches thick. The underlying material is light yellowish brown sandy loam and very pale brown gravelly sandy loam about 15 inches thick. Fractured andesite is at a depth of 18 inches.

Permeability of the Masonfort soil is moderately rapid. The root zone is 10 to 20 inches deep. The available water capacity is very low. Surface runoff is medium, and the water erosion hazard is moderate. The soil blowing hazard is high.

The Nickel soil is deep and well drained. It formed in gravelly alluvium on sides of strongly dissected terraces. Typically, the surface layer is brown and pale brown gravelly sandy loam about 8 inches thick. The underlying material is very pale brown very gravelly sandy loam to a depth of 60 inches or more.

Permeability of the Nickel soil is moderately slow. The root zone is 60 inches deep. The available water capacity is low. Surface runoff is medium, and the water erosion hazard is moderate. The soil blowing hazard is moderate.

The potential plant community on the Masonfort soil includes black grama, bush muhly, threeawn, creosotebush, fourwing saltbush, and winterfat. The potential plant community on the Nickel soil includes bush muhly, black grama, cane bluestem, mariola, tarbush, and winterfat.

Mechanical range seeding is generally not feasible because of climatic limitations. Controlling the spread of creosotebush is difficult. If the plant communities are mismanaged, they deteriorate quickly, and erosion is easily accelerated. The plant communities recover slowly. Pipelines are difficult to bury in the Masonfort soil because of shallowness to bedrock. The construction of earthen ponds is generally not feasible because of slope or shallowness.

Mo—Mimbres silty clay loam. This is a deep, well drained, nearly level to gently undulating soil that formed in fine silty sediment that derived from igneous material. Areas are in slight depressions on flood plains and in swales on fans at an elevation of 4,000 to 5,000 feet. The average annual precipitation is 8 inches, the average annual temperature is 62 degrees F, and the average frost-free period is 210 days.

Included in mapping are areas of Reagan, Stellar, Berino, Bucklebar, and Dona Ana soils and areas of similar soils that have a high content of clay. These included soils make up about 20 percent of the map unit.

Typically, the surface layer of this Mimbres soil is pinkish gray silty clay loam about 10 inches thick. The subsoil is brown silty clay loam about 9 inches thick. The substratum is pinkish gray and brown silty clay loam to a depth of 60 inches or more.

Permeability is moderately slow. The depth of the root zone is 60 inches or more. The available water capacity is very high. Surface runoff is medium, and the water erosion hazard is moderate. The soil blowing hazard is slight.

The Mimbres soil is suited to irrigated crops but is used mainly for grazing and as wildlife habitat.

The potential plant community includes giant sacaton, alkali sacaton, tobosa, vine-mesquite, and a variety of scattered shrubs.

Because areas of this soil are commonly adjacent to upland soils that are much less productive, effective grazing management can become quite complicated. Fencing pasture to separate it from the uplands is beneficial, especially because the more palatable grasses are normally found on the upland soils. Seasonal palatability of such grasses as tobosa must be taken into account, as well as fluctuations in forage production which are associated with periods of summer flooding.

Mechanical range seeding and mechanical brush management are, in some places, feasible practices. Generally, however, seeding is risky, and mesquite is best controlled chemically.

MR—Minlith-Rock outcrop association. This association consists of gently undulating to moderately rolling

soils on uplands in the southwestern part of the survey area. Elevation ranges from 4,000 to 5,000 feet. The average annual precipitation is 8 inches, the average annual temperature is 62 degrees F, and the average frost-free period is 210 days.

This association is about 50 percent Minlith loamy sand, 1 to 15 percent slopes; 20 percent Rock outcrop, 1 to 15 percent slopes; and 20 percent Onite loamy sand, 1 to 5 percent slopes. The Minlith soil is on side slopes and lower slopes. The Onite soil is in depressions and swales and on fans between lava flows. Included in mapping are areas of Pintura, Pajarito, Akela, and Aftaden soils, areas of cinder cones, and areas of basalt rock outcrop where the slopes are steeper. These inclusions make up about 10 percent of this map unit.

The Minlith soil is shallow and somewhat excessively drained. It formed in eolian material and material that weathered from basalt. Typically, the surface layer is light reddish brown loamy sand about 3 inches thick. The underlying material is reddish brown very gravelly loamy sand about 10 inches thick. Fractured, caliche-coated basalt is at a depth of 13 inches.

The Minlith soil is rapidly permeable. The root zone is 10 to 20 inches deep. The available water capacity is very low. Runoff is slow, and the water erosion hazard is slight. The soil blowing hazard is very high.

Rock outcrop consists of basalt extrusions, lava flows, ridges, and cliffs.

The Onite soil is deep and well drained. It formed in alluvium that has been modified by wind. The alluvium was derived from dominantly acid igneous rocks. Typically, the surface layer is brown loamy sand about 5 inches thick. The subsoil is reddish brown sandy loam 22 inches thick. The substratum is light reddish brown loamy sand to a depth of 60 inches or more.

Permeability of the Onite soil is moderately rapid. The depth of the root zone is 60 inches or more. The available water capacity is moderate. Surface runoff is medium, and the water erosion hazard is moderate. The soil blowing hazard is high.

The Onite soil is suited to irrigated crops, but it and the Minlith soil are used mainly for grazing and as wildlife habitat.

The potential plant community on the Minlith soil includes black grama, mesa dropseed, bush muhly, and tobosa. The potential plant community on the Onite soil includes black grama, mesa dropseed, sand dropseed, threeawn, and broom snakeweed. Forbs are an important component of these plant communities.

Range seeding is generally impractical because of low rainfall. Mesquite can be controlled chemically and can be removed by hand grubbing. Mechanical removal is generally not recommended. These soils, particularly the shallow Minlith soil, are not well suited to earthen ponds.

MS—Motoqua-Rock outcrop association. This association consists of undulating to extremely steep soils and Rock outcrop on the Uvas Mountains in the northwestern part of the area. Elevation ranges from 4,600 to 6,650 feet. The average annual precipitation is 15 inches, the average annual temperature is 50 degrees F, and the average frost-free period is 130 days.

This association is about 40 percent Motoqua cobbly loam, 3 to 60 percent slopes, and 30 percent Rock outcrop, 20 to 75 percent slopes.

Included in mapping are areas of similar soils except that some are on gentler slopes, one is shallow to deep, one is moderately deep and is less than 35 percent rock fragments, and one soil is underlain by sandstone. These included soils make up about 30 percent of the map unit.

The Motoqua soil is shallow and well drained. It formed in alluvium and colluvium that was derived from mixed basic igneous rock. Typically, the surface layer is grayish brown cobbly loam about 2 inches thick. The subsoil is grayish brown and dark grayish brown cobbly silt loam about 18 inches thick. Basalt is at a depth of 20 inches. The bedrock is fractured in the upper few inches.

Permeability of the Motoqua soil is moderate. The root zone is 10 to 20 inches deep. The available water capacity is very low. Surface runoff is medium, and the water erosion hazard is slight to moderate. The soil blowing hazard is slight.

Rock outcrop consists of basalt, rhyolite, and tuff that form ridges, flows, cliffs, and isolated extrusions on mesa tops. Tuffaceous sandstone underlies the basalt and is exposed on steep slopes.

The Motoqua soil is very poorly suited to irrigated crops and is used mainly for grazing and as wildlife habitat.

The potential plant community includes black grama, blue grama, sideoats grama, bush muhly, and green sprangletop.

Grazing management is complicated by the steep topography and the Rock outcrop. The slopes and Rock outcrop limit the construction of watering places that could, if closely spaced, improve the distribution of livestock. The livestock tend to graze canyon bottoms and ridge tops much more intensively than side slopes. The Motoqua soil is generally not suited to mechanical range seeding or brush control because of slope.

Fencing can be difficult, but it is a cost-effective practice if adequate stocking rates are maintained. Salt placement is the most effective way to control the distribution of livestock and to reduce the overgrazing of certain areas. The Motoqua soil is very poorly suited to the construction of earthen ponds because of shallowness to bedrock.

NB—Nickel-Badland complex. This complex consists of undulating to moderately rolling soils and moderately rolling to extremely steep Badland on sides of dissected terraces. Elevation ranges from 4,000 to 5,200 feet. The average annual precipitation is 8 inches, the average annual temperature is 62 degrees F, and the average frost-free period is 210 days. Nickel very gravelly sandy

loam, 3 to 15 percent slopes, makes up about 45 percent of the complex; and Badland, 10 to 75 percent slopes, makes up 35 percent.

Included in mapping are areas of Tencee and Upton soils and soils that are similar to the Nickel soil except that they have a subsoil. These included soils make up about 20 percent of the map unit.

The Nickel soil is a deep, well drained soil. It formed in deep, very gravelly alluvium on side slopes and fans. Typically, the surface layer is light brownish gray very gravelly sandy loam about 2 inches thick. The underlying material is pale brown and very pale brown and white very gravelly sandy loam and gravelly sandy loam to a depth of 60 inches or more.

Permeability of the Nickel soil is moderately slow. The available water capacity is very low. Surface runoff is medium, and the water erosion hazard is moderate. The soil blowing hazard is moderate.

Badland consists of barren areas of weathered siltstone, mudstone, and sandstone on ledges and escarpments. Rounded and semi-rounded pebbles and some cobblestones cover much of the surface in some areas. Runoff is rapid, and the water erosion hazard is severe. The soil blowing hazard is slight.

The Nickel soil is poorly suited to irrigated crops because of high gravel content and is used mainly for grazing and recreation and as wildlife habitat. Badland is not suited to intensive grazing.

The potential plant community includes bush muhly, black grama, cane bluestem, creosotebush, mariola, tarbush, and winterfat.

Mechanical range seeding is generally impractical because of climatic limitations and topography. Control and management of creosotebush beyond what proper grazing management can do is difficult. The plant community deteriorates rapidly if mismanaged, and erosion is easily accelerated. Recovery is slow. It may be necessary to exclude livestock to prevent excessive runoff and erosion in critical areas, especially where watershed characteristics are of prime concern. Livestock water development, fencing, and salting are not subject to severe limitations and can help in good livestock distribution. Gravel and rocks in the soil profile limit the installation of underground pipe.

NU—Nickel-Upton association. This association consists of undulating to moderately rolling soils on ridges or side slopes at an elevation of 4,000 to 5,000 feet. The average annual precipitation is 8 inches, the average annual temperature is 62 degrees F, and the average frost-free period is 210 days.

This association is about 50 percent Nickel very gravelly fine sandy loam, 3 to 15 percent slopes, and 25 percent Upton gravelly sandy loam, 3 to 5 percent slopes.

Included in mapping are areas of Tencee, Cave, and Simona soils and similar soils that are shallow to caliche and have a dark surface layer. These inclusions make up about 25 percent of the map unit.

The Nickel soil is deep and well drained. It formed in gravelly alluvium along arroyos and on side slopes. Typically, the surface layer is light brownish gray and pinkish gray very gravelly fine sandy loam about 5 inches thick. The underlying material is pale brown and white very gravelly sandy loam to a depth of 60 inches or more.

Permeability of the Nickel soil is moderately slow. The depth of the root zone is 60 inches or more. The available water capacity is very low to low. Surface runoff is medium, and the water erosion hazard is moderate. The soil blowing hazard is moderate.

The Upton soil is shallow and well drained. It formed in gravelly alluvium on ridgetops. Typically, the surface layer is pale brown gravelly sandy loam about 5 inches thick. The subsoil is very pale brown gravelly sandy loam about 9 inches thick. The substratum is hard caliche.

Permeability of the Upton soil is moderate. The root zone is 20 inches deep. The available water capacity is very low. Surface runoff is medium, and the water erosion hazard is slight. The soil blowing hazard is moderate.

These soils are poorly suited to irrigated crops because of high gravel content and shallowness. They are used mainly for grazing and recreation and as wildlife habitat.

The potential plant community includes bush muhly, black grama, cane bluestem, creosotebush, mariola, tarbush, and winterfat.

Mechanical range seeding is impractical because of climatic limitations and topography. Control and management of creosotebush, beyond what proper grazing management can do, is difficult. The plant community deteriorates rapidly if mismanaged, and erosion is easily accelerated. Recovery is slow. It may be necessary to keep livestock out of critical areas to prevent excessive runoff and erosion. Gravel and hard caliche limit the installation of underground pipe.

OP—Onite-Pajarito association. This association consists of nearly level to gently sloping soils on broad fans at an elevation of 4,000 to 5,000 feet. The average annual precipitation is 8 inches, the average annual temperature is 62 degrees F, and the average frost-free period is 210 days.

This association is about 40 percent Onite loamy sand, 1 to 5 percent slopes; 30 percent Pajarito fine sandy loam, 0 to 5 percent slopes; and 15 percent Pintura fine sand, 0 to 5 percent slopes.

Included in mapping are areas of Wink, Harrisburg, Simona, Berino, and Dona Ana soils. These inclusions make up about 15 percent of the map unit.

The Onite soil is deep and well drained. It formed between dunes in alluvium. Typically, the surface layer is light reddish brown loamy sand about 5 inches thick. The subsoil is reddish brown and light reddish brown sandy loam about 13 inches thick. The substratum is light reddish brown loamy sand to a depth of 60 inches or more.

Permeability of the Onite soil is moderately rapid. The depth of the root zone is 60 inches or more. The availa-

ble water capacity is moderate. Surface runoff is medium, and the water erosion hazard is moderate. The soil blowing hazard is very high.

The Pajarito soil is deep and well drained. It formed between dunes in mixed alluvium. Typically, the surface layer is light brown fine sandy loam about 8 inches thick. The subsoil is light brown fine sandy loam about 17 inches thick. The substratum is yellowish red fine sandy loam and loamy fine sand to a depth of 60 inches or more.

Permeability of the Pajarito soil is moderately rapid. The depth of the root zone is 60 inches or more. The available water capacity is high. Surface runoff is very slow, and the water erosion hazard is moderate. The soil blowing hazard is high.

The Pintura soil is deep and somewhat excessively drained. It formed on dunes in eolian sediments. Typically, the surface layer is light brown fine sand about 8 inches thick. The underlying material is light brown fine sand to a depth of 60 inches or more.

The Pintura soil is rapidly permeable. The depth of the root zone is 60 inches or more. The available water capacity is very low. Surface runoff is very slow, and the water erosion hazard is slight. The soil blowing hazard is very high.

The Onite and Pajarito soils are suited to irrigated crops but are used mainly for grazing and as wildlife habitat. The Pintura soil is poorly suited to irrigated crops because of the low available water capacity.

The Onite and Pajarito soils support potential plant communities that include black grama, mesa dropseed, sand dropseed, threeawn, and broom snakeweed. The potential plant community on the Pintura soil includes mesa dropseed, giant dropseed, bush muhly, sand sagebrush, and fourwing saltbush. Seasonal forbs are a significant component of these plant communities.

Range seeding is generally impractical because of low rainfall. Mesquite can be controlled chemically and can be removed by hand grubbing. Mechanical removal is generally not recommended.

OR—Onite-Pintura complex. This complex consists of nearly level to undulating soils on fans at an elevation of 4,000 to 5,000 feet. The average annual precipitation is 8 inches, the average annual temperature is 62 degrees F, and the average frost-free period is 210 days.

This association is about 50 percent Onite loamy fine sand, 1 to 5 percent slopes, and 25 percent Pintura loamy fine sand, 0 to 5 percent slopes.

Included in mapping are areas of Pajarito, Berino, Bucklebar, and Dona Ana soils. These inclusions make up about 25 percent of the map unit.

The Onite soil is deep and well drained. It formed in alluvium between dunes. Typically, the surface layer is light reddish brown loamy fine sand about 5 inches thick. The subsoil is reddish brown and light reddish brown sandy loam about 15 inches thick. The substratum is yellowish red sandy loam to a depth of 60 inches or more.

Permeability of the Onite soil is moderately rapid. The depth of the root zone is 60 inches or more. The available water capacity is moderate. Surface runoff is medium, and the water erosion hazard is moderate. The soil blowing hazard is very high.

The Pintura soil is deep and somewhat excessively drained. It formed in eolian material on dunes. Typically, the surface layer is brown loamy fine sand about 6 inches thick. The underlying material is light brown fine sand to a depth of 60 inches or more.

The Pintura soil is rapidly permeable. The depth of the root zone is 60 inches or more. The available water capacity is low. Surface runoff is very slow, and the water erosion hazard is slight. The soil blowing hazard is very high.

The Onite soil is suited to irrigated crops but is used mainly for grazing and as wildlife habitat. The Pintura soil is poorly suited to irrigated crops because of the low available water capacity.

The potential plant community on the Onite soil includes black grama, mesa dropseed, sand dropseed, threeawn, and broom snakeweed. The potential plant community on the Pintura soil includes mesa dropseed, giant dropseed, bush muhly, sand sagebrush, fourwing saltbush, and broom dalea. Seasonal forbs are a significant component of these plant communities.

Range seeding is generally impractical because of low rainfall. Mesquite can be controlled chemically and can be removed by hand grubbing. Mechanical removal is generally not recommended.

Pa—Pajarito fine sandy loam. This is a deep, well drained, very gently sloping soil that formed in mixed alluvium that has been modified by wind. It is on fans below the margins of piedmonts and on fans on piedmonts. Elevation ranges from 3,750 to 4,200 feet. The average annual precipitation is 8 inches, the average annual temperature is 60 degrees F, and the average frost-free period is 200 days.

Included in mapping are small areas of Bluepoint, Yturbide, and Adelino soils. The included soils make up 15 percent of the unit; the area of each inclusion is less than 1 acre.

Typically, the surface layer is light brown fine sandy loam 12 inches thick. The subsoil is reddish yellow and yellowish red fine sandy loam about 16 inches thick. The substratum is yellowish red and light red fine sandy loam to a depth of 60 inches.

Permeability is moderately rapid. The root zone is 60 inches deep. The available water capacity is high. The organic matter content in the surface layer is low. Surface runoff is very slow, and the hazard of water erosion is moderate. The soil blowing hazard is high.

If irrigated, this soil is suited to small grains, cotton, grain sorghum, legumes, grasses, vegetables, and nut crops. The primary crops are alfalfa hay, cotton, and small grain. The major limitations are the sandy surface layer and moderately rapid permeability.

Planting crops that produce large amounts of residue and returning this residue to the soil or growing grasses and legumes in rotation helps control soil blowing and maintain the physical condition of the soil. Fertilization and improved water management practices help maintain or increase yields. All crops except legumes generally respond to nitrogen fertilizers. Legumes respond to phosphate fertilizers. Irrigation water can be applied efficiently if properly designed surface, drip, or sprinkler irrigation systems are installed. Rotation grazing increases yields and the quality of pasture. Timely harvesting improves the quality of crops.

If irrigated, this soil has fair potential for windbreaks. Arizona cypress, Rocky Mountain juniper, green ash, cottonwood, Siberian elm, and Russian-olive are suitable trees; and skunkbush sumac, pyracantha, oriental arborvitae, and American plum are suitable shrubs. Special treatment to overcome specific soil conditions may be needed for other species.

The potential plant community includes black grama, mesa dropseed, sand dropseed, threeawn, and broom snakeweed.

Range seeding is generally impractical because of low rainfall. Mesquite can be controlled chemically and can be removed by hand grubbing. Mechanical removal is generally not recommended.

As a result of rapid urban expansion in the Mesilla Valley, some areas of this soil are used for urban development. There are slight limitations for most urban and recreational uses.

Pb—Pajarito-Pintura complex. The soils in this complex are nearly level to gently sloping and are on broad piedmont slopes at an elevation of 4,000 to 4,500 feet. The average annual precipitation is 8 inches, the average annual temperature is 60 degrees F, and the average frost-free period is 210 days.

Pajarito loamy fine sand, 0 to 3 percent slopes, makes up about 45 percent of this complex; Pintura loamy fine sand, 0 to 5 percent slopes, 35 percent; and areas of Wink, Harrisburg, Simona, and Onite soils, about 20 percent.

The Pajarito soil is deep and well drained. It formed between dunes in mixed alluvium that has been modified by wind. Typically, the surface layer is light brown loamy fine sand 14 inches thick. The subsoil is reddish yellow fine sandy loam 14 inches thick. The substratum is light brown loamy very fine sand to a depth of 60 inches.

Permeability is moderately rapid. The root zone is 60 inches deep. The available water capacity is moderate. The organic matter content in the surface layer is low. Surface runoff is very slow, and the water erosion hazard is moderate. The soil blowing hazard is very high.

The Pintura soil is deep and somewhat excessively drained. It formed in eolian material on dunes. Typically, the surface layer is light brown loamy fine sand 10 inches thick. The underlying material is light brown fine sand to a depth of 60 inches.

Permeability is rapid. The root zone is 60 inches deep, and the available water capacity is very low. Surface runoff is very slow, and the soil blowing hazard is very high.

The Pajarito soil is suited to irrigated crops but is used mainly for grazing and as wildlife habitat. The Pintura soil is poorly suited to irrigated crops because of the very low available water capacity.

The potential plant community on the Pajarito soil includes black grama, mesa dropseed, sand dropseed, and threeawn. The potential plant community on the Pintura soil includes mesa dropseed, giant dropseed, bush muhly, sand sagebrush, fourwing saltbush, and broom dalea. Seasonal forbs are a significant component of these plant communities.

Range seeding is generally impractical because of low rainfall. Mesquite can be controlled chemically and can be removed by hand grubbing. Mechanical removal is generally not recommended.

PN—Pinaleno-Nolam association. This association consists of gently undulating to moderately rolling soils on broad fans at an elevation of 4,000 to 5,000 feet. The average annual precipitation is 8 inches, the average annual temperature is 66 degrees F, and the average frost-free period is 210 days.

This association is about 45 percent Pinaleno very gravelly sandy loam, 1 to 10 percent slopes, and 35 percent Nolam very gravelly fine sandy loam, 2 to 10 percent slopes.

Included in mapping are areas of Casito and Terino soils and areas of similar dark-surfaced gravelly loam soils that are about 10 inches deep to indurated caliche and are on the steeper slopes next to the mountains. Some deep very gravelly sandy loam soils that have a weak horizon of calcium accumulation below the subsoil are on the lesser slopes. These inclusions make up about 20 percent of the map unit.

The Pinaleno soil is deep and well drained. It formed on fans and along arroyo banks in stratified very gravelly loamy alluvium that derived from mixed igneous sources. Typically, the surface layer is brown very gravelly sandy loam about 2 inches thick. The subsoil is reddish brown and brown very gravelly sandy loam about 18 inches thick. The substratum is light yellowish brown and light brown very gravelly sandy loam about 17 inches thick over yellowish brown very gravelly loamy sand.

Permeability of the Pinaleno soil is moderately slow. The depth of the root zone is 60 inches or more, and the available water capacity is low. Surface runoff is medium, and the water erosion hazard is slight. The soil blowing hazard is moderate.

The Nolam soil is deep and well drained. It formed on fans and terraces in alluvium that derived from igneous rock. Typically, the surface layer is light brown very gravelly fine sandy loam about 2 inches thick. The subsoil is red and reddish brown very gravelly sandy clay loam about 15 inches thick. The substratum is pink, light

brown, and brown very gravelly sandy loam, very gravelly loamy sand, very gravelly sand, and gravelly sand to a depth of 60 inches or more.

Permeability of the Nolam soil is moderate. The depth of the root zone is 60 inches or more. The available water capacity is very low. Surface runoff is medium, and the water erosion hazard is slight. The soil blowing hazard is slight.

These soils are poorly suited to irrigated crops because of the low available water capacity and are used mainly for grazing and as wildlife habitat. The potential plant communities include black grama, bush muhly, sideoats grama, cane bluestem, plains bristle grass, winterfat, ocotillo, and broom snakeweed.

Range seeding may be impractical on these soils primarily because of climatic limitations.

RE—Riverwash. Riverwash consists of deep, nearly level areas of unconsolidated recent alluvium in the Rio Grande channel, arroyo channels, and small watercourses and on small fans at the end of some of these channels. The soil material is mainly stratified fine sand to coarse sand; pockets of gravel are in the Rio Grande channel. A soil profile has not developed, but, in places, the sediments are mottled because of a high water table. Riverwash is subject to shifting by frequent stream flow and to soil blowing when it is not under water.

In the dry arroyo channels, there is considerable range in texture, but the texture is dominantly sand and gravel. Occasionally, the texture is finer. In general, the soil material is very gravelly, and in some areas there are cobblestones and boulders.

Permeability is variable. The water erosion hazard is very high. The soil blowing hazard is very high.

This miscellaneous area is limited for most uses. It is used as a watershed and as a source of irrigation water. Areas are also used for hunting small game and for fishing.

RF—Riverwash-Arizo complex. This complex consists of Riverwash and nearly level to very gently sloping soils that formed in mixed alluvium on valley floors and arroyos. Elevation ranges from 3,800 to 4,400 feet. The average annual precipitation is 8 inches, the average annual temperature is 60 degrees F, and the average frost-free period is 210 days.

Riverwash, 0 to 3 percent slopes, makes up about 45 percent of the unit, and Arizo loamy sand, 35 percent. Riverwash is in the arroyo channels. The Arizo soil is next to the arroyos in areas that are subject to flooding. Some areas at lower elevations are protected by dams.

Included in mapping are small areas of Bluepoint, Arizo, Canutio, and Yturbide soils. These inclusions make up about 20 percent of the map unit.

Riverwash consists of sand and gravel and, in some areas, cobblestones and boulders.

The Arizo soil is deep and excessively drained. It formed in mixed alluvium on valley floors and in arroyo channels. Typically, the surface layer is light yellowish brown gravelly loamy sand 12 inches thick. The underlying material is very pale brown very gravelly loamy sand to a depth of 60 inches.

The Arizo soil is very rapidly permeable. The root zone is 60 inches deep. Surface runoff is very slow except during periods of convection storms and when the runoff from higher lying soils collects on this soil. The water erosion hazard is severe. The soil blowing hazard is high. Very brief periods of flooding are common in spring and summer.

The potential plant community on the Arizo soil includes mesa dropseed, black grama, bush muhly, fluffgrass, and creosotebush. Seasonal forbs are a significant component of the plant community.

The Arizo soil is not suited to mechanical range seeding mainly because of low rainfall. Mesquite, and possibly creosotebush, can be controlled chemically. Mechanical removal is generally not recommended. There are few limitations to the installation of wells, pipelines, troughs, and tanks; but the very rapid permeability generally precludes the use of the Arizo soil for earthen ponds.

RG—Rock outcrop-Argids association. This association consists of hilly to extremely steep Rock outcrop and shallow to deep soils on hills and dry mountains throughout the survey area. Elevation ranges from 4,000 to 6,000 feet. The average annual precipitation is 8 inches, the average annual temperature is 60 degrees F, and the average frost-free period is 210 days.

This association is about 40 percent Rock outcrop, 15 to 99 percent slopes; 30 percent Argids, 15 to 80 percent slopes; and 20 percent Argids, cool, 15 to 80 percent slopes. Rock outcrop occurs as rough extensions and escarpments, ledges, ridges, and cliffs. The Argids are shallow to deep; gravelly, cobbly, and stony; and moderately coarse textured to fine textured. They are interspersed among the areas of Rock outcrop. The Argids, cool, are similar to the Argids, except that they are on north-facing slopes and in areas that are subject to cool air currents. Areas covered by stones are mostly below but adjacent to areas of Rock outcrop.

Included in mapping are areas of alluvium and alluvial soils on narrow valley floors and in arroyos. Included areas make up about 10 percent of the map unit.

Rock outcrop does not support vegetation. It sheds water, thereby increasing the amount of effective precipitation available to the adjacent soils.

The potential plant community on the Argids includes black grama, blue grama, sideoats grama, bush muhly, cane bluestem, green sprangletop, sotol, agave, and oak.

The potential plant community on the Argids, cool, includes blue grama, sideoats grama, black grama, New Mexico feathergrass, plains lovegrass, oak, mountainmahogany, and skunkbush sumac.

Areas of this complex are generally not suited to mechanical range seeding, brush control, or the installation

of livestock watering places for improved grazing distribution because of Rock outcrop and steep slopes. Fencing can be difficult, but it is a cost-effective practice if adequate stocking rates are maintained. The Argids and Argids, cool, are poorly suited to earthen ponds because of steep slopes.

RH—Rock outcrop-Argids, cool, association. This association consists of very steep and extremely steep Rock outcrop and shallow to deep soils in the Organ Mountains. Elevation ranges from 6,000 to 8,870 feet. The average annual precipitation is 16 inches, the average annual temperature is 51 degrees F, and the average frost-free period is 170 days.

This association is about 45 percent Rock outcrop, 30 to 100 percent slopes; and 35 percent Argids, cool, 30 to 75 percent slopes. The Rock outcrop occurs as rough extrusions and escarpments, ledges, ridges, and cliffs. The Argids, cool, are shallow to deep, gravelly, cobbly, and stony, and moderately coarse textured to fine textured. They are interspersed among the areas of Rock outcrop. Areas covered by stones are mostly below but adjacent to areas of Rock outcrop.

Included in mapping are areas of colluvial and alluvial soils on narrow valley floors and arroyos. Included areas make up about 20 percent of the map unit.

The potential plant community on the Argids, cool, includes blue grama, sideoats grama, black grama, New Mexico feathergrass, plains lovegrass, oak, mountainmahogany, and skunkbush sumac.

Livestock tend to graze canyon bottoms and ridge tops much more intensively than the side slopes. Watering places, if closely spaced, can attract livestock to lesser grazed areas.

These soils are not generally suited to mechanical range seeding or brush control because of steep slopes. Fencing can be difficult, but it is a cost-effective practice if adequate stocking rates are maintained. The Argids, cool, are poorly suited to the construction of earthen ponds because of steep slopes.

RL—Rock outcrop-Lozier association. This association consists of moderately rolling to extremely steep Rock outcrop and soils on limestone hills at an elevation of 4,000 to 6,400 feet. The average annual precipitation is 8 inches, the average annual temperature is 62 degrees F, and the average frost-free period is 210 days.

This association is about 45 percent Rock outcrop, 10 to 75 percent slopes, and 30 percent Lozier stony loam, 10 to 50 percent slopes.

Included in mapping are outcroppings of sandstone and shale, small igneous dikes, and areas of young soils on colluvial slopes and narrow valley floors. These inclusions make up about 25 percent of the map unit.

Rock outcrop is stratified limestone bedrock that is exposed in the form of escarpments or shelves on the upper and steeper parts of the association. Areas are 80 to several hundred acres in size. Some fracturing has occurred in the bedrock, and there has been some colluvial activity on the steeper slopes.

The Lozier soil is shallow and well drained. It formed in material that derived from limestone and is interspersed among areas of Rock outcrop. Typically, the surface layer is pale brown stony loam 2 inches thick. The underlying material is light brown stony and very stony loam 9 inches thick. Thin, hard, caliche-coated limestone is at a depth of 11 inches.

Permeability of the Lozier soil is moderate. The root zone is 4 to 20 inches deep. The available water capacity is very low, but Rock outcrop sheds water, thereby the amount of water available to this soil is increased. As a result, the production of native grasses or forbs can be excellent. Surface runoff is medium, and the water erosion hazard is moderate. The soil blowing hazard is moderate.

The Lozier soil is very poorly suited to irrigated crops because of shallowness to bedrock and the very low available water capacity. It is used primarily for grazing and as wildlife habitat.

The potential plant community includes black grama, gyp grama, and slim tridens. Grazing can be controlled by the proper placement of water facilities.

The Lozier soil is not generally suited to mechanical range seeding or brush control because of the Rock outcrop. Fencing can be difficult because of the shallowness to bedrock, but it is a cost-effective practice if adequate stocking rates are maintained. Salt placement is the most effective way to control the distribution of livestock and to reduce the overgrazing of certain areas. The Lozier soil is very poorly suited to earthen ponds because of the shallowness to bedrock.

RT—Rock outcrop-Torriorthents association. This association consists of moderately rolling to extremely steep Rock outcrop and shallow to deep soils on hills and dry mountains throughout the survey area. Elevation ranges from 4,000 to 6,000 feet. The average annual precipitation is 8 inches, the average annual temperature is 62 degrees F, and the average frost-free period is 210 days.

This association is about 40 percent Rock outcrop, 15 to 99 percent slopes, and 30 percent Torriorthents, 15 to 50 percent slopes. Rock outcrop occurs as extrusions and escarpments, ledges, ridges, lava flows, and cliffs. Torriorthents are interspersed between areas of Rock outcrop. Torriorthents are shallow to deep; gravelly, cobbly, and stony; and moderately coarse textured to fine textured.

Included in mapping are areas of Argids, colluvial and alluvial soils on narrow valley floors and in arroyos, and Nickel soils. These inclusions make up about 30 percent of the map unit.

Rock outcrop sheds water, thereby increasing the amount of effective precipitation to adjacent soils.

The potential plant community includes black grama, blue grama, sideoats grama, bush muhly, cane bluestem, green sprangletop, sotol, agave, and oak.

Grazing management is complicated by the steep slopes and the Rock outcrop. The slopes and Rock outcrop limit the construction of watering places that help improve the distribution of livestock. Livestock tend to graze the canyon bottoms and ridgetops much more intensively than the side slopes.

The Torriorthents are generally not suited to mechanical range seeding or brush control because of steep slopes and Rock outcrop. Fencing can be difficult, but it is a cost-effective practice if adequate stocking rates are maintained. The Torriorthents are poorly suited to earthen ponds because of steep slopes.

SH—Simona-Harrisburg association. This association consists of gently undulating to moderately rolling soils on broad fans and desert mesas. Elevation ranges from 4,000 to 5,000 feet. The average annual precipitation is 8 inches, the average annual temperature is 62 degrees F, and the average frost-free period is 210 days.

This association is about 50 percent Simona sandy loam, 1 to 5 percent slopes, and 25 percent Harrisburg loamy sand, 1 to 5 percent slopes. The Simona soil is on mesa tops and low ridges. The Harrisburg soil is in slight depressions on mesa tops and ridges.

Included in mapping are areas of Simona and Harrisburg soils, 5 to 10 percent slopes, and areas of Wink, Pajarito, Onite, and Cruces soils. These inclusions make up about 25 percent of the map unit.

The Simona soil is shallow and well drained. It formed in calcareous sandy eolian material. Typically, the surface layer is light brown sandy loam about 2 inches thick. The subsoil is light brown sandy loam about 6 inches thick. The substratum is pinkish white sandy loam that is underlain by indurated caliche at a depth of 12 inches.

Permeability of the Simona soil is moderately rapid. The root zone is 10 to 20 inches deep. The available water capacity is very low. Surface runoff is slow, and the water erosion hazard is slight. The soil blowing hazard is high.

The Harrisburg soil is moderately deep and well drained. It formed in wind-blown material that was derived from sandstone, volcanic ash, and shale. Typically, the surface layer is light brown loamy sand about 8 inches thick. The underlying material is light reddish brown sandy loam about 16 inches thick. Pinkish white, hard caliche is at a depth of 24 inches.

Permeability of the Harrisburg soil is moderately rapid above the hardpan. The root zone is 20 to 40 inches deep. The available water capacity is low. Surface runoff is slow, the water erosion hazard is slight, and the soil blowing hazard is high.

The Simona soil is poorly suited to irrigated crops because it is shallow and has a very low available water capacity. The Harrisburg soil is poorly suited to this use because it has a low available water capacity.

The potential plant community on the Simona soil includes black grama, mesa dropseed, sand dropseed, bush muhly, winterfat, and tobosa. The potential plant community on the Harrisburg soil includes black grama, mesa dropseed, sand dropseed, and threeawn. Forbs are an important component of plant communities.

Range seeding is generally impractical because of climatic limitations, mainly low rainfall. Mesquite can be controlled chemically and can be removed by hand grubbing. Mechanical removal is generally not recommended. Earthen ponds are not practical because of the shallowness to bedrock and the moderately rapid permeability. Pipelines are difficult to install where the soil is less than 12 inches deep.

ST—Stellar association. This association consists of nearly level to gently undulating soils on broad fans. Elevation ranges from 4,000 to 5,000 feet. The average annual precipitation is 8 inches, the average annual temperature is 62 degrees F, and the average frost-free period is 210 days.

This association is about 40 percent Stellar clay loam, 0 to 3 percent slopes, on basin floors and on toe slopes of fans, and 40 percent Stellar clay loam, 0 to 3 percent slopes, flooded, in swales on the basin floors.

Included in mapping are areas of Reagan, Dona Ana, Berino, and Mimbres soils. These inclusions make up about 20 percent of the map unit.

Stellar clay loam, 0 to 3 percent slopes, is deep and well drained. It formed in material that was derived from igneous rock. Typically, the surface layer is pinkish gray clay loam about 3 inches thick. The subsoil is reddish brown and pinkish white clay loam and sandy clay loam to a depth of 60 inches or more.

Permeability of this soil is slow. The depth of the root zone is 60 inches or more. The available water capacity is high. Surface runoff is slow, and the water erosion hazard is slight. The soil blowing hazard is moderate.

Stellar clay loam, 0 to 2 percent slopes, flooded, is deep and well drained. It formed in sediment that was derived from igneous rock. Typically, the surface layer is pinkish gray clay loam 5 inches thick. The subsoil is reddish brown clay 26 inches thick. The substratum is reddish brown and light brown clay loam to a depth of 60 inches or more.

Permeability of this soil is slow. The depth of the root zone is 60 inches or more. The available water capacity is high. Surface runoff is slow. The water erosion hazard is slight. Very brief periods of flooding are common in summer. The soil blowing hazard is slight.

The Stellar soils are suited to irrigated crops but are used mainly for grazing and as wildlife habitat.

The potential plant community on the Stellar soil that is not flooded includes tobosa, alkali sacaton, threeawn, and fourwing saltbush. The potential plant community on the Stellar soil that is flooded includes giant sacaton, alkali sacaton, tobosa, vine-mesquite, and a variety of scattered shrubs.

Effective grazing management on these soils can be complicated. The best management practice for the

flooded soil commonly is rotation-deferred grazing. Wherever possible, fencing pastures to separate them from the uplands is beneficial, especially because the more palatable grasses normally grow on the upland soils. Seasonal palatability of such grasses as tobosa must be taken into account, as well as vast and sudden fluctuations in forage production, which are associated with periods of flooding or drought in summer.

Mechanical range seeding and mechanical brush management are feasible in places. Generally, mesquite is best controlled chemically, and seeding is risky because of low rainfall.

TE—Tencee-Upton association. This association consists of undulating to moderately rolling soils on ridgetops and side slopes. Elevation ranges from 4,000 to 5,000 feet. The average annual precipitation is 8 inches, the average annual temperature is 62 degrees F, and the average frost-free period is 210 days.

This association is about 35 percent Tencee very gravelly sandy loam, 3 to 15 percent slopes, and 20 percent Upton gravelly sandy loam, 3 to 15 percent slopes. The Tencee soil is along the side slopes of the ridges. The Upton soil is on ridgetops.

Included in mapping are areas of Nickel, Cave, and Simona soils. These inclusions make up about 45 percent of the map unit.

The Tencee soil is shallow and well drained. It formed in gravelly alluvium. Typically, the surface layer is light brown, very gravelly sandy loam about 7 inches thick. It is underlain by hard caliche.

The Tencee soil is moderately permeable. The root zone is 7 to 20 inches deep. The available water capacity is very low. Surface runoff is rapid, and the water erosion hazard is slight. The soil blowing hazard is moderate.

The Upton soil is shallow and well drained. It formed in mixed alluvium. Typically, the surface layer is pale brown gravelly sandy loam about 8 inches thick. The subsoil is very pale brown gravelly sandy loam about 8 inches thick. The substratum is hard caliche.

The Upton soil is moderately permeable. The root zone is 10 to 20 inches deep. The available water capacity is very low. Surface runoff is medium, and the water erosion hazard is slight. The soil blowing hazard is moderate.

The Tencee and Upton soils are used mainly for grazing and as wildlife habitat.

The potential plant community includes bush muhly, black grama, creosotebush, mariola, and tarbush.

Mechanical range seeding is generally impractical on these soils because of climatic limitations and topography. Control and management of creosotebush, beyond what proper grazing management can do, is difficult. The plant community deterioriates rapidly if mismanaged, and erosion is easily accelerated. Recovery is slow. It may be necessary to exclude livestock from critical areas, especially watersheds, to prevent excessive runoff and erosion. Gravel and rocks in the soils and the shallowness to bedrock can limit the installation of underground pipe.

TF—Terino-Casito association. This association consists of gently undulating to moderately rolling soils on broad fans and terraces. Elevation ranges from 4,000 to 5,000 feet. The average annual precipitation is 8 inches, the average annual temperature is 62 degrees F, and the average frost-free period is 210 days.

This association is about 40 percent Terino very gravelly sandy loam, 1 to 8 percent slopes; 30 percent Casito very gravelly sandy loam, 1 to 8 percent slopes; and 20 percent Pinaleno very gravelly sandy loam, 1 to 10 percent slopes. The Terino soil and the Casito soil are on low ridges and side slopes. The Pinaleno soil is on fans and along arroyo banks.

Included in mapping are areas, on steeper slopes next to the mountains, of similar hard-surfaced soils that are about 10 inches deep to indurated caliche. Deep very gravelly sandy loam soils that have a weak horizon of calcium accumulation are on the lesser slopes. The included soils make up about 10 percent of the map unit.

The Terino soil is shallow and well drained. It formed in very gravelly sediments that derived primarily from igneous rock. Typically, the surface layer is brown very gravelly sandy loam about 2 inches thick. The subsoil is reddish brown and yellowish red very gravelly sandy loam and very gravelly sandy clay loam about 13 inches thick. The substratum is pink, very gravelly carbonate cemented material about 17 inches thick. Under this hard caliche, light brown very gravelly sandy loam extends to a depth of 60 inches or more.

Permeability of the Terino soil is moderately slow. The root zone is 8 to 20 inches deep. The available water capacity is very low. Surface runoff is slow, and the water erosion hazard is slight. The soil blowing hazard is slight.

The Casito soil is shallow and well drained. It formed in very gravelly sediments that derived primarily from igneous rock. Typically, the surface layer is light brown very gravelly sandy loam about 2 inches thick. The subsoil is brown and reddish brown very gravelly sandy loam and very gravelly sandy clay loam about 10 inches thick. The layer below that is pink and pinkish white, hard caliche about 6 inches thick. Below that, light brown very gravelly sandy loam, sandy loam, and very gravelly loamy sand extend to a depth of 60 inches or more.

The Casito soil is moderately permeable. The root zone is 8 to 20 inches deep. The available water capacity is very low. Surface runoff is medium, and the water erosion hazard is slight. The soil blowing hazard is high.

The Pinaleno soil is deep and well drained. It formed in stratified very gravelly loamy alluvium from mixed igneous sources. Typically, the surface layer is light brown very gravelly sandy loam about 2 inches thick. The subsoil is reddish brown very gravelly sandy clay loam about 28 inches thick. The substratum is reddish brown and pinkish gray, stratified very gravelly loamy sand and gravelly sandy loam to a depth of 60 inches or more.

Permeability of the Pinaleno soil is moderately slow. The depth of the root zone is 60 inches or more. The available water capacity is low. Surface runoff is slow to medium, depending on slope, and the water erosion hazard is slight. The soil blowing hazard is moderate.

The Terino, Casito, and Pinaleno soils are used mainly for grazing and as wildlife habitat.

The potential plant community on the Terino and Casito soils includes bush muhly, black grama, threeawn, creosotebush, mariola, range ratany, tarbush, and winterfat. The potential plant community on the Pinaleno soil includes black grama, bush muhly, sideoats grama, threeawn, and tobosa.

Mechanical range seeding is generally impractical on these soils because of climatic limitations and topography. Creosotebush is difficult to control. The plant community deteriorates rapidly if mismanaged, and erosion is easily accelerated. Recovery is slow. It may be necessary to exclude livestock to prevent excess runoff and erosion in critical areas, especially watersheds. Gravel and rocks and the shallowness to bedrock limit the installation of underground pipe.

Vf—Vinton Variant fine sandy loam. This is a deep, well drained, nearly level soil that formed in mixed alluvium on the flood plain of the Rio Grande at an elevation of 3,700 to 4,120 feet. Areas of this soil have been leveled for use as irrigated cropland and are protected from floodwater of the Rio Grande by dams and levees. The average annual precipitation is 8 inches, the average annual temperature is 60 degrees F, and the average frost-free period is 200 days.

Included in mapping are areas of Vinton sandy clay loam, Anthony-Vinton clay loams and loams, and Glendale, Agua, and Brazito soils. Also included are areas of this Vinton soil that are not protected by levees and are susceptible to flooding. In these areas the soil is used only for grazing and recreation and as wildlife habitat. The included soils make up 15 percent of the map unit; the area of each inclusion is less than 1 acre.

Typically, the surface layer of this Vinton soil is brown fine sandy loam 14 inches thick. The underlying material is pale brown loamy fine sand to a depth of 32 inches and light brownish gray silty clay loam to a depth of 42 inches. Below that, to a depth of 60 inches, it is pale brown sand.

Permeability is moderately rapid in the upper part and moderately slow in the lower part. The depth of the root zone is 60 inches or more. The available water capacity is high. The content of organic matter is low in the surface layer. Surface runoff is slow, and the water erosion hazard is slight. The soil blowing hazard is high.

If irrigated, this soil is suited to small grains, cotton, grain sorghum, legumes, grasses, and vegetables. The primary crops are alfalfa hay, cotton, and small grains. The major limitations are restricted water movement and rooting depth caused by thick, fine textured layers in the underlying material.

Planting crops that produce large amounts of residue and returning this residue to the soil or growing grasses and legumes in rotation helps control soil blowing and maintain the physical condition of the soil. Fertilization and improved water management practices help maintain or increase yields. All crops except legumes generally respond to nitrogen fertilizers. Legumes respond to phosphate fertilizers. Irrigation water can be applied efficiently if properly designed surface, drip, or sprinkler irrigation systems are installed. Rotation grazing increases yields and the quality of pasture. Timely harvesting improves the quality of crops.

If irrigated, this soil has fair potential for windbreaks. Arizona cypress, Rocky Mountain juniper, green ash, cottonwood, Siberian elm, and Russian-olive are suitable trees; and skunkbush sumac, pyracantha, oriental arborvitae, and American plum are suitable shrubs. Special treatment to overcome specific soil conditions may be needed for other species.

As a result of rapid urban expansion in the Mesilla Valley, some areas of this soil are used for urban development. The moderately slow permeability at a depth of about 32 inches is a limitation for septic tank filter fields; but this limitation can be overcome by placing the filter field above this depth or by planting vegetation that uses the water.

Vg—Vinton Variant sandy clay loam. This is a deep, well drained, nearly level soil that formed in alluvium on the flood plain of the Rio Grande at an elevation of 3,700 to 4,120 feet. Areas of this soil have been leveled for irrigated cropland and are protected from floodwater of the Rio Grande by dams and levees. The average annual precipitation is 8 inches, the average annual temperature is 60 degrees F, and the average frost-free period is 200 days.

Included in mapping are areas of Vinton Variant fine sandy loam, Anthony-Vinton clay loams and loams, and Glendale, Agua, and Brazito soils. The included soils make up 15 percent of the map unit; the area of each inclusion is generally less than 1 acre.

Typically, the surface layer is brown sandy clay loam about 16 inches thick. The underlying material, to a depth of 33 inches, is pale brown fine sand. Below that, to a depth of 60 inches, it is light brownish gray clay.

Permeability is moderately rapid in the upper part and moderately slow in the lower part. The depth of the root zone is 60 inches or more. The available water capacity is high. The organic matter content is low in the surface layer. Surface runoff is slow, and the water erosion hazard is slight. The soil blowing hazard is high.

If irrigated, this soil is suited to small grains, cotton, grain sorghum, legumes, grasses, and vegetables. The primary crops are alfalfa hay, cotton, and small grains. The major limitations for crops are a layered subsoil and substratum that limit water movement and rooting.

Planting crops that produce large amounts of residue and returning this residue to the soil or growing grasses

and legumes helps control soil blowing and maintain the physical condition of the soil. Fertilization and improved water management practices help maintain or increase yields. All crops except legumes generally respond to nitrogen fertilizer. Legumes respond to phosphate fertilizers. Irrigation water can be applied efficiently if properly designed surface, drip, or sprinkler irrigation systems are installed. Rotation grazing increases yields and the quality of pasture. Timely harvesting improves the quality of crops.

If irrigated, this soil has good potential for windbreaks. Arizona cypress, Rocky Mountain juniper, green ash, cottonwood (cottonless), Siberian elm, and Russian-olive are suitable trees; skunkbush sumac, pyracantha, oriental arborvitae, and American plum are suitable shrubs. Special treatment to overcome specific soil conditions may be needed for other species.

As a result of rapid urban expansion in the Mesilla Valley, some areas of the Vinton soil are used for urban development. The moderately slow permeability at a depth of about 33 inches is a limitation for septic tank filter fields. This limitation can be overcome by placing the filter field at a lesser depth or by planting vegetation that uses the water.

WH—Wink-Harrisburg association. This association consists of gently undulating to undulating soils on broad fans at an elevation of 4,000 to 5,000 feet. The average annual precipitation is 8 inches, the average annual temperature is 62 degrees F, and the average frost-free period is 210 days.

This association is about 35 percent Wink fine sandy loam, 1 to 3 percent slopes; 25 percent Harrisburg loamy fine sand, 1 to 5 percent slopes; and 20 percent Simona sandy loam, 1 to 5 percent slopes. The Wink soil is in slight depressions on uplands. The Harrisburg and Simona soils are on slight ridges and slopes on uplands.

Included in mapping and making up about 20 percent of the association are areas of Pintura, Pajarito, and Onite soils.

The Wink soil is deep and well drained. It formed in eolian material. Typically, the surface layer is light brown fine sandy loam about 2 inches thick. The subsoil is light brown fine sandy loam about 24 inches thick. The substratum is light brown sandy loam to a depth of 60 inches or more.

Permeability of the Wink soil is moderately rapid. The root zone is 20 to 40 inches deep. The available water capacity is low. Runoff is slow, and the water erosion hazard is moderate. The soil blowing hazard is high.

The Harrisburg soil is moderately deep and well drained. It formed in residuum of sandstone, volcanic ash, and shale. Typically, the surface layer is light brown loamy fine sand about 4 inches thick. The underlying material is light reddish brown fine sandy loam about 20 inches thick over hard caliche.

Permeability of the Harrisburg soil is moderately rapid to the hardpan. The root zone is 24 to 40 inches deep. The available water capacity is very low. Surface runoff is slow, the water erosion hazard is slight, and the soil blowing hazard is very high.

The Simona soil is shallow and well drained. It formed in calcareous sandy eolian material. Typically, the surface layer is light brown sandy loam about 2 inches thick. The subsoil is light brown sandy loam about 5 inches thick. It is underlain by pinkish white, indurated caliche.

Permeability of the Simona soil is moderately rapid. The root zone is 7 to 20 inches deep. The available water capacity is very low. Surface runoff is slow, and the water erosion hazard is slight. The soil blowing hazard is high.

These soils are used mainly for grazing and as wildlife habitat.

The potential plant community on the Wink and Harrisburg soils includes black grama, mesa dropseed, sand dropseed, threeawn, and longleaf ephedra. Forbs also are an important component. The potential plant community on the Simona soil includes black grama, mesa dropseed, sand dropseed, bush muhly, winterfat, and tobosa.

Range seeding is generally impractical because of climatic limitations, mainly low rainfall. Mesquite can be controlled chemically.

Earthen ponds are not practical mainly because of the moderately rapid permeability. Pipelines are difficult to install properly if hard caliche is at a depth of less than 15 inches.

WP—Wink-Pintura complex. This complex consists of gently undulating to undulating soils on broad fans at an elevation of 4,000 to 4,500 feet. The average annual precipitation is 8 inches, the average annual temperature is 62 degrees F, and the average frost-free period is 210 days.

Wink loamy fine sand, 1 to 3 percent slopes, makes up about 45 percent of the unit; Pintura fine sand, 1 to 5 percent slopes, makes up 35 percent. The Wink soil is between coppice dunes, and the Pintura soil is on the dunes. The slope of the dunes exceeds 50 percent in places.

Included in mapping and making up 20 percent of the map unit are areas of Pajarito, Harrisburg, Simona, and Onite soils.

The Wink soil is deep and well drained. It formed in old unconsolidated alluvium that has been modified by wind. Typically, the surface layer is light brown loamy fine sand 10 inches thick. The subsoil is pink sandy loam 10 inches thick. The substratum is pink sandy loam and loamy fine sand to a depth of 60 inches.

Permeability of the Wink soil is moderately rapid. The depth of the root zone is 60 inches. The available water capacity is low. Surface runoff is slow, and the water erosion hazard is slight. The soil blowing hazard is high.

The Pintura soil is deep and somewhat excessively drained. It formed in eolian material. Typically, the soil is light brown fine sand to a depth of 60 inches or more.

Permeability of the Pintura soil is rapid. The depth of the root zone is 60 inches or more. The available water capacity is low. Surface runoff is very slow. The water erosion hazard is slight, and the soil blowing hazard is very high.

The Wink soil is suited to irrigated crops but is used mainly for grazing and as wildlife habitat. The Pintura soil is poorly suited to irrigated crops because of the low available water capacity.

The potential plant community on the Wink soil includes black grama, mesa dropseed, threeawn, and fourwing saltbush. The potential plant community on the Pintura soil includes mesa dropseed, giant dropseed, bush muhly, threeawn, sand sagebrush, and fourwing saltbush.

Range seeding on these soils is generally impractical because of low rainfall. Mesquite can be controlled chemically.

Use and management of the soils

The soil survey is a detailed inventory and evaluation of the most basic resource of the survey area—the soil. It is useful in adjusting land use, including urbanization, to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in uses of the land.

While a soil survey is in progress, soil scientists, conservationists, engineers, and others keep extensive notes about the nature of the soils and about unique aspects of behavior of the soils. These notes include data on erosion, drought damage to specific crops, yield estimates, flooding, the functioning of septic tank disposal systems, and other factors affecting the productivity, potential, and limitations of the soils under various uses and management. In this way, field experience and measured data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section is useful in planning use and management of the soils for crops and pasture and rangeland; as sites for buildings, highways and other transportation systems, sanitary facilities, and parks and other recreation facilities; and for wildlife habitat. From the data presented, the potential of each soil for specified land uses can be determined, soil limitations to these land uses can be identified, and costly failures in houses and other structures, caused by unfavorable soil properties, can be avoided. A site where soil properties are favorable can be selected, or practices that will overcome the soil limitations can be planned.

Planners and others using the soil survey can evaluate the impact of specific land uses on the overall productivity of the survey area or other broad planning area and on the environment. Productivity and the environment are closely related to the nature of the soil. Plans should maintain or create a land-use pattern in harmony with the natural soil.

Contractors can find information that is useful in locating sources of sand and gravel, roadfill, and topsoil. Other information indicates the presence of bedrock, wetness, or very firm soil horizons that cause difficulty in excavation.

Health officials, highway officials, engineers, and many other specialists also can find useful information in this soil survey. The safe disposal of wastes, for example, is closely related to properties of the soil. Pavements, sidewalks, campsites, playgrounds, lawns, and trees and shrubs are influenced by the nature of the soil.

Crops and pasture

Paul Boden, conservation agronomist, Soil Conservation Service, helped prepare this section.

The major management concerns in the use of the soils for crops and pasture are described in this section. In addition, the crops or pasture plants best suited to the soil, including some not commonly grown in the survey area, are discussed; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are presented for each soil.

This section provides information about the overall agricultural potential of the survey area and about the management practices that are needed. The information is useful to equipment dealers, land improvement contractors, fertilizer companies, processing companies, planners, conservationists, and others. For each kind of soil, information about management is presented in the section "Soil maps for detailed planning." Planners of management systems for individual fields or farms should also consider the detailed information given in the description of each soil.

There are about 98,310 acres of irrigated land in the Dona Ana soil survey area. Nearly all of this acreage is along the Rio Grande. Water is delivered to the farms by canals from diversions and dams. Most of the areas are protected from floodwaters of the Rio Grande by dikes. Irrigation water is adequate for good crop yields in all areas but is not always available when needed.

The main crops are cotton, vegetables (fig. 4), pecans (fig. 5), small grains (fig. 6), grain sorghum, alfalfa for hay, and improved grasses for pasture. There is a high potential for good yields of such vegetable crops as lettuce, onions, and chili peppers.

Most soils have specific limitations and are subject to hazards that limit their use to some extent. For example, Brazito loamy sand has a low available water capacity and is subject to soil blowing because of its sandy texture. Armijo clay has severe limitations for certain types of plants because of the clayey surface layer, very slow permeability, and susceptibility to increases in salinity and alkalinity. If these hazards and limitations are recognized and considered in management, the basic resource can be maintained and a reasonable yield can be achieved.

The major objectives in cropland management are proper irrigation, maintaining the physical condition and fertility of the soil, and controlling soil blowing. Reducing excess salinity or alkalinity and providing adequate drainage are management concerns in some areas.

Timely application of an adequate amount of irrigation water without overirrigating is essential to obtain a high yield and to conserve water. A properly designed irrigation system is based on the characteristics of the soil and on the crop to be grown. Overirrigation leaches plant nutrients out of the root zone, contributes to excessive wetness in lower lying areas, and reduces yields by reducing aeration in the root zone.

A crop rotation that helps to keep soils in good physical condition is desirable. Some soils can be used for a single crop for many years with little adverse effect on yields. Other soils deteriorate rapidly unless large amounts of organic matter are returned to the soil annually. A conservation cropping system tailored to the individual soil can help maintain good yields, structure, aeration, and fertility. Rotating crops helps to reduce insect, disease, and weed infestations.

Soil blowing is a serious hazard on sandy soils. This hazard can best be controlled by leaving an adequate amount of residue from the previous crop on the surface until the new crop can provide a ground cover. Stripcropping and planting trees and shrubs in windbreaks are also effective in preventing soil blowing.

Overirrigation and seepage from irrigation canals can cause a high water table and poor drainage in some soils on the flood plains. In poorly drained soils, alkalinity and salinity commonly increase to a level that inhibits plant growth. In places, surface or subsurface drains can improve drainage and thus decrease salinity or alkalinity. However, properly irrigating the soils in higher lying areas and lining the irrigation canals are necessary in many areas to effectively lower the water table.

All of the irrigated soils in the survey area are suited to improved grasses for pasture. The major management concerns are proper irrigation, adequate fertilization, and rotation grazing.

Yields of annual crops, hay crops, and pasture plants can be increased by the use of improved crop varieties, timely planting and harvesting, controlling weeds, insects, and diseases, and by other good management practices.

Yields per acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. Absence of an estimated yield indicates that the soil is not suited to the crop or the crop is not commonly grown on the soil or that a given crop is not commonly irrigated.

The estimated yields were based mainly on the experience and records of farmers, conservationists, and extension agents. Results of field trials and demonstrations and available yield data from nearby counties were also considered.

The yields were estimated assuming that the latest soil and crop management practices were used. Hay yields were estimated for the most productive variety of grass suited to the climate and the soil. A few farmers may be obtaining average yields higher than those shown in table 5.

The management needed to achieve the indicated yields of the various crops depends on the kind of soil and the crop. Such management provides drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate tillage practices, including time of tillage and seedbed preparation and tilling when soil moisture is favorable; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residues, barnyard manure, and green-manure crops; harvesting crops with the smallest possible loss; and timeliness of all fieldwork.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown; that good quality irrigation water is uniformly applied in proper amounts as needed; and that tillage is kept to a minimum.

The estimated yields reflect the productive capacity of the soils for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not included because the acreage of these crops is small. The local offices of the Soil Conservation Service and the Cooperative Extension Service can provide information about the management concerns and productivity of the soils for these crops.

Rangeland

James C. Powell, range conservationist, Soil Conservation Service, helped to prepare this section.

Where climate and topography are about the same, differences in the kind and amount of vegetation that rangeland can produce are related closely to the kind of soil. Effective management is based on the relationships among soils, vegetation, and water.

Table 6 shows, for each kind of soil, the name of the range site; the total annual production of vegetation in favorable, normal, and unfavorable years; the characteristic vegetation; and the expected percentage of each species in the composition of the potential natural plant community. Soils not listed cannot support a natural plant community of predominately grasses, grasslike

plants, forbs, or shrubs suitable for grazing or browsing. The following are explanations of column headings in table 6.

A *range site* is a distinctive kind of rangeland that differs from other kinds of rangeland in its ability to produce a characteristic natural plant community. Soils that produce a similar kind, amount, and proportion of range plants are grouped into range sites. For those areas where the relationship between soils and vegetation has been established, range sites can be interpreted directly from the soil map. Properties that determine the capacity of the soil to supply moisture and plant nutrients have the greatest influence on the productivity of range plants. Soil reaction, salt content, and a seasonal high water table are also important.

Total production refers to the amount of vegetation that can be expected to grow annually on well managed rangeland that is supporting the potential natural plant community. It is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. In a favorable year the amount and distribution of precipitation and the temperatures are such that growing conditions are substantially better than average; in a normal year these conditions are about average for the area; in an unfavorable year, growing conditions are well below average, generally because of low available soil moisture.

Dry weight refers to the total air-dry vegetation produced per acre each year by the potential natural plant community. Vegetation that is highly palatable to livestock and vegetation that is unpalatable are included. Some of the vegetation can also be grazed extensively by wildlife.

Characteristic species of grasses, grasslike plants, forbs, and shrubs that make up most of the potential natural plant community on each soil are listed by common name. Under *Composition*, the expected proportion of each species is presented as the percentage, in air-dry weight, of the total annual production of herbaceous and woody plants. The amount that can be used as forage depends on the kinds of grazing animals and on the grazing season. Generally all of the vegetation produced is not used.

Range management requires, in addition to knowledge of the kinds of soil and the potential natural plant community, an evaluation of the present condition of the range vegetation in relation to its potential. Range condition is determined by comparing the present plant community with the potential natural plant community on a particular range site. The more closely the existing community resembles the potential community, the better the range condition. The objective in range management is to control grazing so that the plants growing on a site are about the same in kind and amount as the potential natural plant community for that site. Such management generally results in the maximum production of vegetation, conservation of water, and control of erosion. Sometimes, however, a range condition somewhat below the potential meets grazing needs, provides wildlife habitat, and protects soil and water resources.

About 65 percent of the survey area is rangeland; however, less than half of the total farm income is derived from range livestock. Cow-calf operations dominate. Yearling operations are beginning to play a significantly larger role than in the past. Ranch sizes differ considerably; ranches as large as 50,000 acres or more are not unusual. Fifty percent or more of the rangeland is owned by the Bureau of Land Management. The rest is an approximately equal combination of privately owned and State owned land.

The native vegetation in many parts of the survey area has been greatly depleted by continued excessive use, especially in prolonged periods of drought. Much of the acreage that was once desert grassland is now dominated by shrubs and annual forbs. Total forage production has been reduced by at least half, and, in many cases, by much more. Significant range improvement can be effected in some areas by grazing management alone; but in many areas, invading brush must be controlled before significant recovery of range grasses can be achieved.

Grazing management that will improve or maintain the vegetative cover is essential to prevent soil erosion and to improve moisture infiltration. Grazing management should be implemented that will sustain or increase the vigor, production, and reproduction of the more palatable and productive grasses and shrubs. The use of a planned grazing system that varies the seasons of grazing and of rest for pasture from year to year results in a balanced plant community and provides higher quality forage throughout the year. Continuous year-long grazing usually results in a deteriorated plant community of less value to domestic livestock. Controlling the stocking rate and the frequency and intensity of grazing is essential to the success of any grazing program. The suitability of some plants for use as seasonal forage and the ephemeral nature of the forb component of the plant community are management concerns. Livestock is most effectively distributed by the use of fences, wells, pipelines, crops, tanks, and salt licks.

The southern and western parts of the survey area are dominated by sandy soils that are subject to soil blowing, hummocking, and invasion of mesquite. Sandy soils, some deep and some shallow, that generally are underlain by caliche are common to the northern part of the survey area. Gravelly, calcareous soils, which are mainly on mountain foot slopes, are also in this area in significant proportions and are subject to an invasion by creosotebush or tarbush, or both. In many of these areas it is necessary to control or remove undesirable brush species to minimize the hazard of soil blowing and to improve production of desirable vegetation.

Windbreaks and environmental plantings

Windbreaks are established to protect livestock, buildings, and yards from winds, blowing dust, and snow.

Windbreaks also help protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of both broad-leafed and coniferous species provide the most protection.

Field windbreaks are plantings of one to three rows made at right angles to the prevailing wind and at specific intervals across the field, the interval depending on erodibility of the soil. They protect cropland and crops from wind, hold snow on the fields, and provide food and cover for wildlife.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. A healthy planting stock of suitable species planted properly on a well prepared site and maintained in good condition can insure a high degree of plant survival. There is a good selection of ornamental plants for use in the survey area.

In this survey area, irrigation is necessary for the establishment, growth, and survival of windbreaks and environmental plantings. If irrigated regularly, nearly all soils, except the very limey or strongly alkaline soils, are suited to trees and shrubs for windbreaks.

Additional information about planning windbreaks and screens and the planting and care of trees can be obtained from the local offices of the Soil Conservation Service, the Cooperative Extension Service, the New Mexico State Forest Service, or from nurserymen.

Engineering

Myron H. Namkin, civil engineer, Soil Conservation Service, prepared this section.

This section provides information about the use of soils for building sites, sanitary facilities, construction material, and water management. Among those who can benefit from this information are engineers, landowners, community planners, town and city managers, land developers, builders, contractors, and farmers and ranchers.

The ratings in the engineering tables are based on test data and estimated data in the "Soil properties" section. The ratings were determined jointly by soil scientists and engineers of the Soil Conservation Service using known relationships between the soil properties and the behavior of soils in various engineering uses.

Among the soil properties and site conditions identified by a soil survey and used in determining the ratings in this section were grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock that is within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure or aggregation, in-place soil density, and geologic origin of the soil material. Where pertinent, data about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of absorbed cations were also considered.

On the basis of information assembled about soil properties, ranges of values can be estimated for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, shear strength, compressibility, slope stability, and other factors of expected soil behavior in engineering uses. As appropriate, these values can be applied to each major horizon of each soil or to the entire profile.

These factors of soil behavior affect construction and maintenance of roads, airport runways, pipelines, foundations for small buildings, ponds and small dams, irrigation projects, drainage systems, sewage and refuse disposal systems, and other engineering works. The ranges of values can be used to (1) select potential residential, commercial, industrial, and recreational areas; (2) make preliminary estimates pertinent to construction in a particular area; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for location of sanitary landfills, onsite sewage disposal systems, and other waste disposal facilities; (5) plan detailed onsite investigations of soils and geology; (6) find sources of gravel, sand, clay, and topsoil; (7) plan farm drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; (8) relate performance of structures already built to the properties of the kinds of soil on which they are built so that performance of similar structures on the same or a similar soil in other locations can be predicted; and (9) predict the trafficability of soils for cross-country movement of vehicles and construction equipment.

Data presented in this section are useful for land-use planning and for choosing alternative practices or general designs that will overcome unfavorable soil properties and minimize soil-related failures. Limitations to the use of these data, however, should be well understood. First, the data are generally not presented for soil material below a depth of 5 or 6 feet. Also, because of the scale of the detailed map in this soil survey, small areas of soils that differ from the dominant soil may be included in mapping. Thus, these data do not eliminate the need for onsite investigations, testing, and analysis by personnel having expertise in the specific use contemplated.

The information is presented mainly in tables. Table 7 shows, for each kind of soil, the degree and kind of limitations for building site development; table 8, for sanitary facilities; and table 10, for water management. Table 9 shows the suitability of each kind of soil as a source of construction materials.

The information in the tables, along with the soil map, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations and to construct interpretive maps for specific uses of land.

Some of the terms used in this soil survey have a special meaning in soil science. Many of these terms are defined in the Glossary.

Building site development

The degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, and local roads and streets are indicated in table 7. A *slight* limitation indicates that soil properties generally are favorable for the specified use and that limitations are minor and easily overcome. A *moderate* limitation indicates that soil properties and site features are unfavorable for the specified use, but the limitations can be overcome or minimized by special planning and design. A *severe* limitation indicates that one or more soil properties or site features are so unfavorable or difficult to overcome that a major increase in construction effort, special design, or intensive maintenance is required. For some soils rated severe, costly measures may not be feasible.

Shallow excavations are made for pipelines, sewerlines, communications and power transmission lines, basements, open ditches, and cemeteries. Such digging or trenching is influenced by soil wetness caused by a seasonal high water table; the texture and consistence of soils; the tendency of soils to cave in or slough; and the presence of very firm, dense soil layers, bedrock, or large stones. In addition, excavations are affected by slope of the soil and the probability of flooding. Ratings do not apply to soil horizons below a depth of 6 feet unless otherwise noted.

In the soil series descriptions, the consistence of each soil horizon is given, and the presence of very firm or extremely firm horizons, usually difficult to excavate, is indicated.

Dwellings and *small commercial buildings* referred to in table 7 are built on undisturbed soil and have foundation loads of a dwelling no more than three stories high. Separate ratings are made for small commercial buildings without basements and for dwellings with and without basements. For such structures, soils should be sufficiently stable that cracking or subsidence of the structure from settling or shear failure of the foundation does not occur. These ratings were determined from estimates of the shear strength, compressibility, and shrink-swell potential of the soil. Soil texture, plasticity and in-place density, potential frost action, soil wetness, and depth to a seasonal high water table were also considered. Soil wetness and depth to a seasonal high water table indicate potential difficulty in providing adequate drainage for basements, lawns, and gardens. Depth to bedrock, slope, and large stones in or on the soil are also important considerations in the choice of sites for these structures and were considered in determining the ratings. Susceptibility to flooding is a serious hazard.

Local roads and streets referred to in table 7 have an all-weather surface that can carry light to medium traffic all year. They consist of a subgrade of the underlying soil material; a base of gravel, crushed rock fragments, or soil material stabilized with lime or cement; and a flexible or rigid surface, commonly asphalt or concrete. The roads are graded with soil material at hand, and most cuts and fills are less than 6 feet deep.

The load supporting capacity and the stability of the soil as well as the quantity and workability of fill material available are important in design and construction of roads and streets. The classifications of the soil and the soil texture, density, shrink-swell potential, and potential frost action are indicators of the traffic supporting capacity used in making the ratings. Soil wetness, flooding, slope, depth to hard rock or very compact layers, and content of large stones affect stability and ease of excavation.

Sanitary facilities

Favorable soil properties and site features are needed for proper functioning of septic tank absorption fields, sewage lagoons, and sanitary landfills. The nature of the soil is important in selecting sites for these facilities and in identifying limiting soil properties and site features to be considered in design and installation. Also, those soil properties that affect ease of excavation or installation of these facilities will be of interest to contractors and local officials. Table 8 shows the degree and kind of limitations of each soil for such uses and for use of the soil as daily cover for landfills. It is important to observe local ordinances and regulations.

If the degree of soil limitation is expressed as *slight*, soils are generally favorable for the specified use and limitations are minor and easily overcome; if *moderate*, soil properties or site features are unfavorable for the specified use, but limitations can be overcome by special planning and design; and if *severe*, soil properties or site features are so unfavorable or difficult to overcome that major soil reclamation, special designs, or intensive maintenance is required. Soil suitability is rated by the terms *good*, *fair*, and *poor*, which mean about the same as *slight*, *moderate*, and *severe*.

Septic tank absorption fields are subsurface systems of tile or perforated pipe that distribute effluent from a septic tank into the natural soil. Only the soil horizons between depths of 18 and 72 inches are evaluated for this use. The soil properties and site features considered are those that affect the absorption of the effluent and those that affect the construction of the system.

Properties and features that affect absorption of the effluent are permeability, depth to seasonal high water table, depth to bedrock, and susceptibility to flooding. Stones, boulders, and shallowness to bedrock interfere with installation. Excessive slope can cause lateral seepage and surfacing of the effluent. Also, soil erosion and soil slippage are hazards if absorption fields are installed on sloping soils.

In some soils, loose sand and gravel or fractured bedrock is less than 4 feet below the tile lines. In these soils the absorption field does not adequately filter the effluent, and ground water in the area may be contaminated.

On many of the soils that have moderate or severe limitations for use as septic tank absorption fields, a

system to lower the seasonal water table can be installed or the size of the absorption field can be increased so that performance is satisfactory.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons have a nearly level floor and cut slopes or embankments of compacted soil material. Aerobic lagoons generally are designed to hold sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. Soils that are very high in content of organic matter and those that have cobbles, stones, or boulders are not suitable. Unless the soil has very slow permeability, contamination of ground water is a hazard if the seasonal high water table is above the level of the lagoon floor. If the water table is seasonally high, seepage of ground water into the lagoon can seriously reduce the lagoon's capacity for liquid waste. Slope, depth to bedrock, and susceptibility to flooding also affect the suitability of sites for sewage lagoons or the cost of construction. Shear strength and permeability of compacted soil material affect the performance of embankments.

Sanitary landfill is a method of disposing of solid waste by placing refuse in successive layers either in excavated trenches or on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil material. Landfill areas are subject to heavy vehicular traffic. Risk of polluting ground water and trafficability affect the suitability of a soil for this use. The best soils have a loamy or silty texture, have moderate to slow permeability, are deep to a seasonal water table, and are not subject to flooding. Clayey soils are likely to be sticky and difficult to spread. Sandy or gravelly soils generally have rapid permeability, which might allow noxious liquids to contaminate ground water. Soil wetness can be a limitation because operating heavy equipment on a wet soil is difficult. Seepage into the refuse increases the risk of pollution of ground water.

Ease of excavation affects the suitability of a soil for the trench type of landfill. A suitable soil is deep to bedrock and free of large stones and boulders. If the seasonal water table is high, water will seep into trenches.

Unless otherwise stated, the limitations in table 8 apply only to the soil material within a depth of about 6 feet. If the trench is deeper, a limitation of slight or moderate may not be valid. Site investigation is needed before a site is selected.

Daily cover for landfill should be soil that is easy to excavate and spread over the compacted fill in wet and dry periods. Soils that are loamy or silty and free of stones or boulders are better than other soils. Clayey soils may be sticky and difficult to spread; sandy soils may be subject to soil blowing.

The soils selected for final cover of landfills should be suitable for growing plants. Of all the horizons, the A horizon in most soils has the best workability, more organic matter, and the best potential for growing plants. Thus, for either the area- or trench-type landfill, stockpiling material from the A horizon for use as the surface layer of the final cover is desirable.

If it is necessary to bring in soil material for daily or final cover, thickness of suitable soil material available and depth to a seasonal high water table in soils surrounding the site should be evaluated. Other factors to be evaluated are those that affect reclamation of the borrow areas. These factors include slope, erodibility, and potential for plant growth.

Construction materials

The suitability of each soil as a source of roadfill, sand, gravel, and topsoil is indicated in table 9 by ratings of good, fair, or poor. The texture, thickness, and organic-matter content of each soil horizon are important factors in rating soils for use as construction material. Each soil is evaluated to the depth observed, generally about 6 feet.

Roadfill is soil material used in embankments for roads. Soils are evaluated as a source of roadfill for low embankments, which generally are less than 6 feet high and less exacting in design than high embankments. The ratings reflect the ease of excavating and working the material and the expected performance of the material where it has been compacted and adequately drained. The performance of soil after it is stabilized with lime or cement is not considered in the ratings, but information about some of the soil properties that influence such performance is given in the descriptions of the soil series.

The ratings apply to the soil material between the A horizon and a depth of 5 to 6 feet. It is assumed that soil horizons will be mixed during excavation and spreading. Many soils have horizons of contrasting suitability within their profile. The estimated engineering properties in table 13 provide specific information about the nature of each horizon. This information can help determine the suitability of each horizon for roadfill.

Soils rated *good* are coarse grained. They have low shrink-swell potential, low frost action potential, and few cobbles and stones. They are at least moderately well drained and have slopes of 15 percent or less. Soils rated *fair* have a plasticity index of less than 15 and have other limiting features, such as moderate shrink-swell potential, moderately steep slopes, wetness, or many stones. If the thickness of suitable material is less than 3 feet, the entire soil is rated *poor.*

Sand and *gravel* are used in great quantities in many kinds of construction. The ratings in table 9 provide guidance as to where to look for probable sources and are based on the probability that soils in a given area contain sizable quantities of sand or gravel. A soil rated *good* or *fair* has a layer of suitable material at least 3 feet thick, the top of which is within a depth of 6 feet. Coarse fragments of soft bedrock material, such as

shale and siltstone, are not considered to be sand and gravel. Fine-grained soils are not suitable sources of sand and gravel.

The ratings do not take into account depth to the water table or other factors that affect excavation of the material. Descriptions of grain size, kinds of minerals, reaction, and stratification are given in the soil series descriptions and in table 13.

Topsoil is used in areas where vegetation is to be established and maintained. Suitability is affected mainly by the ease of working and spreading the soil material in preparing a seedbed and by the ability of the soil material to support plantlife. Also considered is the damage that can result at the area from which the topsoil is taken.

The ease of excavation is influenced by the thickness of suitable material, wetness, slope, and amount of stones. The ability of the soil to support plantlife is determined by texture, structure, and the amount of soluble salts or toxic substances. Organic matter in the A1 or Ap horizon greatly increases the absorption and retention of moisture and nutrients. Therefore, the soil material from these horizons should be carefully preserved for later use.

Soils rated *good* have at least 16 inches of friable loamy material at their surface. They are free of stones and cobbles, are low in content of gravel, and have gentle slopes. They are low in soluble salts that can restrict plant growth. They are naturally fertile or respond well to fertilizer. They are not so wet that excavation is difficult during most of the year.

Soils rated *fair* are loose sandy soils or firm loamy or clayey soils in which the suitable material is only 8 to 16 inches thick or soils that have appreciable amounts of gravel, stones, or soluble salt.

Soils rated *poor* are very sandy soils or very firm clayey soils; soils that have suitable layers less than 8 inches thick; soils that have large amounts of gravel, stones, or soluble salt; steep soils; and poorly drained soils.

Although a rating of *good* is not based entirely on high content of organic matter, a surface horizon is generally preferred for topsoil because of its organic-matter content. This horizon is designated as A1 or Ap in the soil series descriptions. The absorption and retention of moisture and nutrients for plant growth are greatly increased by organic matter.

Water management

Many soil properties and site features that affect water management practices have been identified in this soil survey. In table 10 the soil and site features that affect use are indicated for each kind of soil. This information is significant in planning, installing, and maintaining water control structures.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have a low seepage potential, which is determined by permeability and the depth to fractured or permeable bedrock or other permeable material.

Embankments, dikes, and levees require soil material that is resistant to seepage, erosion, and piping and has favorable stability, shrink-swell potential, shear strength, and compaction characteristics. Large stones and organic matter in a soil downgrade the suitability of the soil for use in embankments, dikes, and levees.

Aquifer-fed excavated ponds are bodies of water made by excavating a pit or dugout into a ground-water aquifer. Excluded are ponds that are fed by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Ratings in table 10 are for ponds that are properly designed, located, and constructed. Soil properties and site features that affect aquifer-fed ponds are depth to a permanent water table, permeability of the aquifer, quality of the water, and ease of excavation.

Drainage of soil is affected by such soil properties as permeability; texture; depth to bedrock, hardpan, or other layers that affect the rate of water movement; depth to the water table; slope; stability of ditchbanks; susceptibility to flooding; salinity and alkalinity; and availability of outlets for drainage.

Irrigation is affected by such features as slope, susceptibility to flooding, hazards of water erosion and soil blowing, texture, presence of salts and alkali, depth of root zone, rate of water intake at the surface, permeability of the soil below the surface layer, available water capacity, need for drainage, and depth to the water table.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to intercept runoff. They allow water to soak into the soil or flow slowly to an outlet. Features that affect suitability of a soil for terraces are uniformity and steepness of slope; depth to bedrock, hardpan, or other unfavorable material; large stones; permeability; ease of establishing vegetation; and resistance to water erosion, soil blowing, soil slipping, and piping.

Recreation

William J. Slone, biologist, Soil Conservation Service, prepared this section.

The soils of the survey area are rated in table 11 according to limitations that affect their suitability for recreation uses. The ratings are based on such restrictive soil features as flooding, wetness, slope, and texture of the surface layer. Not considered in these ratings, but important in evaluating a site, are location and accessibility of the area, size and shape of the area and its scenic quality, the ability of the soil to support vegetation, access to water, potential water impoundment sites available, and either access to public sewerlines or capacity of the soil to absorb septic tank effluent. Soils

subject to flooding are limited, in varying degree, for recreation use by the duration and intensity of flooding and the season when flooding occurs. Onsite assessment of height, duration, intensity, and frequency of flooding is essential in planning recreation facilities.

The degree of the limitation of the soils is expressed as slight, moderate, or severe. *Slight* means that the soil properties are generally favorable and that the limitations are minor and easily overcome. *Moderate* means that the limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 11 can be supplemented by information in other parts of this survey. Especially helpful are interpretations for septic tank absorption fields, given in table 8, and interpretations for dwellings without basements and for local roads and streets, given in table 7.

Camp areas require such site preparation as shaping and leveling for tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils for this use have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing camping sites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for use as picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that will increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones or boulders, is firm after rains, and is not dusty when dry. If shaping is required to obtain a uniform grade, the depth of the soil over bedrock or hardpan should be enough to allow necessary grading.

Paths and trails for walking, horseback riding, bicycling, and other uses should require little or no cutting and filling. The best soils for this use are those that are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once during the annual period of use. They have moderate slopes and have few or no stones or boulders on the surface.

Wildlife habitat

William J. Stone, biologist, Soil Conservation Service, prepared this section.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover, and they affect the construction of water impoundments. The kind and abundance of wildlife that populate an area depend largely on the amount and distribution of food, cover, and water. If any one of these elements is missing, is inadequate, or is inaccessible, wildlife either are scarce or do not inhabit the area.

If the soils have the potential, wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by helping the natural establishment of desirable plants. Conservation practices applicable to this survey area are: grazing management, brush management, construction of wildlife waterings and ponds, and fish-pond management.

In table 12, the soils in the survey area are rated according to their potential to support the main kinds of wildlife habitat in the area. This information can be used in planning for parks, wildlife refuges, nature study areas, and other developments for wildlife; selecting areas that are suitable for wildlife; selecting soils that are suitable for creating, improving, or maintaining specific elements of wildlife habitat; and determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* means that the element of wildlife habitat or the kind of habitat is easily created, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected if the soil is used for the designated purpose. A rating of *fair* means that the element of wildlife habitat or kind of habitat can be created, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* means that limitations are severe for the designated element or kind of wildlife habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* means that restrictions for the element of wildlife habitat or kind of habitat are very severe and that unsatisfactory results can be expected. Wildlife habitat is impractical or even impossible to create, improve, or maintain on soils having such a rating.

The elements of wildlife habitat are briefly described in the following paragraphs.

Grain and seed crops are seed-producing annuals used by wildlife. The major soil properties that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes that are planted for wildlife food and cover. Major soil properties that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, lovegrass, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds, that provide food and cover for wildlife. Major soil properties that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bush muhly, dropseed, and grama.

Coniferous plants are cone-bearing trees, shrubs, or ground cover plants that furnish habitat or supply food in the form of browse, seeds, or fruitlike cones. Soil properties that have a major effect on the growth of coniferous plants are depth of the root zone, available water capacity, and wetness. An example is juniper.

Shrubs are bushy woody plants that produce fruit, buds, twigs, bark, or foliage used by wildlife or that provide cover and shade for some species of wildlife. Major soil properties that affect the growth of shrubs are depth of the root zone, available water capacity, salinity, and moisture. Examples of shrubs are creosotebush and fourwing saltbush.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites, exclusive of submerged or floating aquatics. They produce food or cover for wildlife that use wetland as habitat. Major soil properties affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are wildrice, saltgrass, rushes, sedges, and reeds.

Shallow water areas are bodies of water that have an average depth of less than 5 feet and that are useful to wildlife. They can be naturally wet areas, or they can be created by dams or levees or by water-control structures in marshes or streams. Major soil properties affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. The availability of a dependable water supply is important if water areas are to be developed. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The kinds of wildlife habitat are briefly described in the following paragraphs.

Openland habitat consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The kinds of wildlife attracted to these areas include bobwhite quail, pheasant, meadowlark, field sparrow, cottontail rabbit, and red fox.

Woodland habitat consists of areas of hardwoods or conifers, or a mixture of both, and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include mourning dove, thrushes, woodpeckers, rock squirrels, gray fox, and raccoon.

Wetland habitat consists of open, marshy or swampy, shallow water areas where water-tolerant plants grow. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver. Irrigation canals and drainage ditches provide habitat for fish, clams, snails, and other aquatic life.

Rangeland habitat consists of areas of wild herbaceous plants and shrubs. Wildlife attracted to rangeland include antelope, desert mule deer, meadowlark, and quail.

Soil properties

Extensive data about soil properties are summarized on the following pages. The two main sources of these data are the many thousands of soil borings made during the course of the survey and the laboratory analyses of selected soil samples from typical profiles.

In making soil borings during field mapping, soil scientists can identify several important soil properties. They note the seasonal soil moisture condition or the presence of free water and its depth. For each horizon in the profile, they note the thickness and color of the soil material; the texture, or amount of clay, silt, sand, and gravel or other coarse fragments; the structure, or the natural pattern of cracks and pores in the undisturbed soil; and the consistence of the soil material in place under the existing soil moisture conditions. They record the depth of plant roots, determine the pH or reaction of the soil, and identify any free carbonates.

Samples of soil material are analyzed in the laboratory to verify the field estimates of soil properties and to determine all major properties of key soils, especially properties that cannot be estimated accurately by field observation. Laboratory analyses are not conducted for all soil series in the survey area, but laboratory data for many soil series not tested are available from nearby survey areas.

The available field and laboratory data are summarized in tables. The tables give the estimated range of engineering properties, the engineering classifications, and the physical and chemical properties of each major horizon of each soil in the survey area. They also present data about pertinent soil and water features, engineering test data, and data obtained from physical and chemical laboratory analyses of soils.

Engineering index properties

Table 13 gives estimates of engineering properties and classifications for the major horizons of each soil in the survey area.

Most soils have, within the upper 5 or 6 feet, horizons of contrasting properties. Table 13 gives information for each of these contrasting horizons in a typical profile. *Depth* to the upper and lower boundaries of each horizon is indicated. More information about the range in depth and about other properties in each horizon is given for each soil series in the section "Soil series and morphology."

Texture is described in table 13 in the standard terms used by the U.S. Department of Agriculture (*22*). These terms are defined according to percentages of sand, silt, and clay in soil material that is less than 2 millimeters in diameter. "Loam," for example, is soil material that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If a soil contains gravel or other particles coarser than sand, an appropriate modifier is added, for example, "gravelly loam." Other texture terms are defined in the Glossary.

The two systems commonly used in classifying soils for engineering use are the Unified Soil Classification System (*2*) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO) (*1*).

The *Unified* system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter, plasticity index, liquid limit, and organic-matter content. Soils are grouped into 15 classes—eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes have a dual classification symbol, for example, CL-ML.

The *AASHTO* system classifies soils according to those properties that affect their use in highway construction and maintenance. In this system a mineral soil is classified in one of seven basic groups ranging from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines. At the other extreme, in group A-7, are fine-grained soils. Highly organic soils are classified in group A-8 on the basis of visual inspection.

The estimated classification, without group index numbers, is given in table 13. Also in table 13 the percentage, by weight, of rock fragments more than 3 inches in diameter is estimated for each major horizon. These estimates are determined mainly by observing volume percentage in the field and then converting that, by formula, to weight percentage.

Percentage of the soil material less than 3 inches in diameter that passes each of four sieves (U.S. standard) is estimated for each major horizon. The estimates are based on tests of soils that were sampled in the survey area and in nearby areas and on field estimates from many borings made during the survey.

Liquid limit and *plasticity index* indicate the effect of water on the strength and consistence of soil. These indexes are used in both the Unified and AASHTO soil classification systems. They are also used as indicators in making general predictions of soil behavior. Range in liquid limit and in plasticity index is estimated on the basis of test data from the survey area or from nearby areas and on observations of the many soil borings made during the survey.

In some surveys, the estimates are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount across classification boundaries (1 or 2 percent), the classification in the marginal zone is omitted.

Physical and chemical properties

Table 14 shows estimated values for several soil characteristics and features that affect behavior of soils in engineering uses. These estimates are given for each major horizon, at the depths indicated, in the typical pedon of each soil. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, and plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earth-moving operations.

Permeability is estimated on the basis of known relationships among the soil characteristics observed in the field—particularly soil structure, porosity, and gradation or texture—that influence the downward movement of water in the soil. The estimates are for vertical water movement when the soil is saturated. Not considered in the estimates is lateral seepage or such transient soil features as plowpans and surface crusts. Permeability of the soil is an important factor to be considered in planning and designing drainage systems, in evaluating the potential of soils for septic tank systems and other waste disposal systems, and in many other aspects of land use and management.

Available water capacity is rated on the basis of soil characteristics that influence the ability of the soil to hold water and make it available to plants. Important characteristics are content of organic matter, soil texture, and soil structure. Shallow-rooted plants are not likely to use the available water from the deeper soil horizons. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design of irrigation systems.

Soil reaction is expressed as range in pH values. The range in pH of each major horizon is based on many

field checks. For many soils, the values have been verified by laboratory analyses. Soil reaction is important in selecting the crops, ornamental plants, or other plants to be grown; in evaluating soil amendments for fertility and stabilization; and in evaluating the corrosivity of soils.

Salinity is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of the nonirrigated soils. The salinity of individual irrigated fields is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of individual fields can differ greatly from the value given in table 14. Salinity affects the suitability of a soil for crop production, its stability when used as a construction material, and its potential to corrode metal and concrete.

Shrink-swell potential depends mainly on the amount and kind of clay in the soil. Laboratory measurements of the swelling of undisturbed clods were made for many soils. For others the swelling was estimated on the basis of the kind and amount of clay in the soil and on measurements of similar soils. The size of the load and the magnitude of the change in soil moisture content also influence the swelling of soils. Shrinking and swelling of some soils can cause damage to building foundations, basement walls, roads, and other structures unless special designs are used. A high shrink-swell potential indicates that special design and added expense may be required if the planned use of the soil will not tolerate large volume changes.

Erosion factors are used to predict the erodibility of a soil and its tolerance to erosion in relation to specific kinds of land use and treatment. The soil erodibility factor (K) is a measure of the susceptibility of the soil to erosion by water. Soils having the highest K values are the most erodible. K values range from 0.10 to 0.64. To estimate annual soil loss per acre, the K value of a soil is modified by factors representing plant cover, grade and length of slope, management practices, and climate. The soil-loss tolerance factor (T) is the maximum rate of soil erosion, whether from rainfall or soil blowing, that can occur without reducing crop production or environmental quality. The rate is expressed in tons of soil loss per acre per year.

Wind erodibility groups are made up of soils that have similar properties that affect their resistance to soil blowing if cultivated. The groups are used to predict the susceptibility of soil to blowing and the amount of soil lost as a result of blowing. Soils are grouped according to the following distinctions:

1. Sands, coarse sands, fine sands, and very fine sands. These soils are extremely erodible, so vegetation is difficult to establish. They are generally not suitable for crops.

2. Loamy sands, loamy fine sands, and loamy very fine sands. These soils are very highly erodible, but crops can be grown if intensive measures to control soil blowing are used.

3. Sandy loams, coarse sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible, but crops can be grown if intensive measures to control soil blowing are used.

4L. Calcareous loamy soils that are less than 35 percent clay and more than 5 percent finely divided calcium carbonate. These soils are erodible, but crops can be grown if intensive measures to control soil blowing are used.

4. Clays, silty clays, clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible, but crops can be grown if measures to control soil blowing are used.

5. Loamy soils that are less than 18 percent clay and less than 5 percent finely divided calcium carbonate and sandy clay loams and sandy clays that are less than 5 percent finely divided calcium carbonate. These soils are slightly erodible, but crops can be grown if measures to control soil blowing are used.

6. Loamy soils that are 18 to 35 percent clay and less than 5 percent finely divided calcium carbonate, except silty clay loams. These soils are very slightly erodible, and crops can easily be grown.

7. Silty clay loams that are less than 35 percent clay and less than 5 percent finely divided calcium carbonate. These soils are very slightly erodible, and crops can easily be grown.

8. Stony or gravelly soils and other soils not subject to soil blowing.

Soil and water features

Table 15 contains information helpful in planning land uses and engineering projects that are likely to be affected by soil and water features.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are placed in one of four groups on the basis of the intake of water after the soils have been wetted and have received precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist chiefly of deep, well drained to excessively drained sands or gravels. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils that have a layer that impedes the downward movement of water or soils that have moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist

chiefly of clay soils that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding is the temporary covering of soil with water from overflowing streams, with runoff from adjacent slopes, and by tides. Water standing for short periods after rains or after snow melts is not considered flooding, nor is water in swamps and marshes. Flooding is rated in general terms that describe the frequency and duration of flooding and the time of year when flooding is most likely. The ratings are based on evidence in the soil profile of the effects of flooding, namely thin strata of gravel, sand, silt, or, in places, clay deposited by floodwater; irregular decrease in organic-matter content with increasing depth; and absence of distinctive soil horizons that form in soils of the area that are not subject to flooding. The ratings are also based on local information about floodwater levels in the area and the extent of flooding and on information that relates the position of each soil on the landscape to historic floods.

The generalized description of flood hazards is of value in land-use planning and provides a valid basis for land-use restrictions. The soil data are less specific, however, than those provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table is the highest level of a saturated zone more than 6 inches thick for a continuous period of more than 2 weeks during most years. The depth to a seasonal high water table applies to undrained soils. Estimates are based mainly on the relationship between grayish colors or mottles in the soil and the depth to free water observed in many borings made during the course of the soil survey.

Information about the seasonal high water table helps in assessing the need for specially designed foundations, the need for specific kinds of drainage systems, and the need for footing drains to insure dry basements. Such information is also needed to decide whether or not construction of basements is feasible and to determine how septic tank absorption fields and other underground installations will function. Also, a seasonal high water table affects ease of excavation.

Depth to bedrock is shown for all soils that are underlain by bedrock at a depth of 5 to 6 feet or less. For many soils, the limited depth to bedrock is a part of the definition of the soil series. The depths shown are based on measurements made in many soil borings and on other observations during the mapping of the soils. The kind of bedrock and its hardness as related to ease of excavation is also shown. Rippable bedrock can be excavated with a single-tooth ripping attachment on a 200-horsepower tractor, but hard bedrock generally requires blasting.

Cemented pans are hard subsurface layers, within a depth of 5 or 6 feet, that are strongly compacted (indurated). Such pans cause difficulty in excavation. The hardness of pans is similar to that of bedrock. A rippable pan can be excavated, but a hard pan generally requires blasting.

Risk of corrosion pertains to potential soil-induced chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to soil moisture, particle-size distribution, total acidity, and electrical conductivity of the soil material. The rate of corrosion of concrete is based mainly on the sulfate content, texture, and acidity of the soil. Protective measures for steel or more resistant concrete help to avoid or minimize damage resulting from the corrosion. Uncoated steel intersecting soil boundaries or soil horizons is more susceptible to corrosion than an installation that is entirely within one kind of soil or within one soil horizon.

Engineering index test data

Table 16 contains the results of engineering tests performed by the New Mexico State Highway Department on several important soils in this survey area. The table shows the specific location where samples were taken, the depth to which sampling was done, and the results of tests to determine particle-size distribution and other properties significant to engineering.

Mechanical analysis shows the percentages, by weight, of soil particles that pass sieves of specified sizes. Sand and coarser materials do not pass through the No. 200 sieve, but silt and clay do. Silt particles are those larger than 0.002 millimeter in diameter that pass through the No. 200 sieve. Clay is that fraction passing through the No. 200 sieve that is smaller than 0.002 millimeter in diameter. The clay fraction was determined by the hydrometer method rather than the pipette method.

Liquid limit and *plasticity index* indicate the effect of water on the strength and consistence of soil material. As the moisture content of a clayey soil is increased from a dry condition, the material changes from a semisolid to a plastic state. If the moisture content is further increased, the material changes from a plastic to a liquid state. The plastic limit is the moisture content at which the soil material passes from semisolid to plastic. The liquid limit is the moisture content at which the material changes from plastic to liquid. The plasticity index is the numerical difference between the liquid limit and the plastic limit. It indicates the range of moisture content within which a soil material is plastic.

Classification of the soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*23*). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. In

this system the classification is based on the different soil properties that can be observed in the field or those that can be inferred either from other properties that are observable in the field or from the combined data of soil science and other disciplines. The properties selected for the higher categories are the result of soil genesis or of factors that affect soil genesis. In table 17, the soils of the survey area are classified according to the system. Categories of the system are discussed in the following paragraphs.

ORDER. Ten soil orders are recognized as classes in the system. The properties used to differentiate among orders are those that reflect the kind and degree of dominant soil-forming processes that have taken place. Each order is identified by a word ending in *sol*. An example is Aridisol.

SUBORDER. Each order is divided into suborders based primarily on properties that influence soil genesis and are important to plant growth or that are selected to reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Argid (*Arg*, meaning having an illuvial horizon, plus *id*, from Aridisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of expression of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and a prefix that suggests something about the properties of the soil. An example is Haplargids (*Hapl*, meaning simple horizons, plus *argid*, the suborder of Aridisols that have an argillic horizon).

SUBGROUP. Each great group may be divided into three subgroups: the central (typic) concept of the great groups, which is not necessarily the most extensive subgroup; the intergrades, or transitional forms to other orders, suborders, or great groups; and the extragrades, which have some properties that are representative of the great groups but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that is thought to typify the great group. An example is Typic Haplargids.

FAMILY. Families are established within a subgroup on the basis of similar physical and chemical properties that affect management. Among the properties considered in horizons of major biological activity below plow depth are particle-size distribution, mineral content, temperature regime, thickness of the soil penetrable by roots, consistence, moisture equivalent, soil slope, and permanent cracks. A family name consists of the name of a subgroup and a series of adjectives. The adjectives are the class names for the soil properties used as family differentiae. An example is fine-loamy, mixed, nonacid, thermic, Typic Haplargids.

SERIES. The series consists of soils that formed in a particular kind of material and have horizons that, except for texture of the surface soil or of the underlying substratum, are similar in differentiating characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineral and chemical composition.

Soil series and morphology

In this section, each soil series recognized in the survey area is described in detail. The descriptions are arranged in alphabetic order by series name.

Characteristics of the soil and the material in which it formed are discussed for each series. The soil is then compared to similar soils and to nearby soils of other series. Then a pedon, a small three-dimensional area of soil that is typical of the soil series in the survey area, is described. The detailed descriptions of each soil horizon follow standards in the Soil Survey Manual (*22*). Unless otherwise noted, colors described are for dry soil.

Following the pedon description is the range of important characteristics of the soil series in this survey area. Phases, or map units, of each soil series are described in the section "Soil maps for detailed planning."

Adelino series

The Adelino series consists of deep, well drained soils on fans. These soils formed in mixed old alluvium. Slopes are 0 to 1 percent. The average annual precipitation is 8 inches, and the average annual air temperature is 60 degrees F.

Adelino soils are similar to Mimbres and Pajarito soils. The Mimbres soils are moderately fine textured and are high in content of silt. Pajarito soils are moderately coarse-textured.

Typical pedon of Adelino clay loam, in the SE1/4SW1/4 sec. 11, T. 21 S., R. 1 W., 100 yards south of gravel pit, in SE corner of an abandoned field:

Ap—0 to 5 inches; light brown (7.5YR 6/4) clay loam, brown (7.5YR 5/4) moist; weak medium platy and moderate medium subangular blocky structure; hard, firm, sticky and plastic; common very fine roots; common very fine tubular pores; slightly calcareous; moderately alkaline; clear smooth boundary.

B21—5 to 14 inches; brown (7.5YR 5/4) clay loam, dark brown (7.5YR 4/4) moist; weak prismatic and moderate medium and fine subangular blocky structure; hard, firm, sticky and plastic; common very fine roots; common fine tubular pores; slightly calcareous; moderately alkaline; clear smooth boundary.

B22—14 to 20 inches; brown (7.5YR 5/4) clay loam, dark brown (7.5YR 4/4) moist; moderate medium and coarse subangular blocky structure; hard, firm, sticky and plastic; few very fine roots; common fine tubular pores; moderately calcareous; strongly alkaline; clear smooth boundary.

B3ca—20 to 27 inches; light brown (7.5YR 6/4) silty clay loam, brown (7.5YR 5/4) moist; weak fine and medium subangular blocky structure; hard, firm, sticky and plastic; few very fine roots; few fine tubular pores; moderately calcareous containing few soft masses of calcium carbonate; strongly alkaline; clear smooth boundary.

C1ca—27 to 35 inches; light brown (7.5YR 6/4) loam, brown (7.5YR 5/4) moist; weak fine subangular blocky structure; hard, very friable, slightly sticky and slightly plastic; no roots; few fine tubular pores; moderately calcareous containing common soft masses of calcium carbonate; strongly alkaline; clear smooth boundary.

C2ca—35 to 46 inches; light brown (7.5YR 6/4) loam, brown (7.5YR 5/4) moist; massive; very hard, very friable, slightly sticky and slightly plastic; no roots; few fine tubular pores; moderately calcareous containing few soft masses of calcium carbonate; strongly alkaline; clear smooth boundary.

C3—46 to 60 inches; light brown (7.5YR 6/4) loam, brown (7.5YR 5/4) moist; massive; very hard, very friable, slightly sticky and slightly plastic; no roots; few fine tubular pores; moderately calcareous with few soft masses of calcium carbonate; strongly alkaline.

The A horizon is light brown, brown, or pale brown clay loam or sandy clay loam.

The B horizon is light brown, pale brown, or brown clay loam, loam, or silty clay loam that is 24 to 35 percent clay.

The Cca horizon is light brown, pale brown, or pink clay loam, sandy clay loam, or loam that is 22 to 32 percent clay. The content of lime ranges from disseminated lime to common medium and fine mottles that have a calcium carbonate equivalent of about 8 to l4 percent. Thin patchy caliche coatings are on the bottom of pebbles.

The C3 horizon is light bown, pale brown, very pale brown, or pink sandy clay loam or loam that is 22 to 33 percent clay.

Aftaden series

The Aftaden series consists of shallow, well drained soils that formed in eolian material and residuum of basalt. Aftaden soils are on uplands. Slopes range from 1 to 15 percent. The average annual precipitation is 8 inches, and the average annual air temperature is 62 degrees F.

Aftaden soils are similar to the Lozier and Minlith soils. Unlike Aftaden soils, Lozier and Minlith soils do not have a B2t horizon and are more than 35 percent gravel in the control section.

Typical pedon of Aftaden loamy sand, in an area of Aftaden-Rock outcrop association, in the NW1/4NW1/4 sec. 18, T. 26 S., R. 4 W.

A1—0 to 2 inches; reddish brown (5YR 5/4) loamy sand, reddish brown (5YR 4/4) moist; single grained; loose dry or moist, nonsticky and nonplastic; many very fine roots; many very fine interstitial pores; 5 percent basalt gravel; neutral; abrupt smooth boundary.

B21t—2 to 10 inches; reddish brown (5YR 5/4) fine sandy loam, reddish brown (5YR 4/4) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few fine and very fine roots; few fine tubular and many fine interstitial pores; few thin clay films on faces of peds; 5 percent basalt gravel; neutral; clear smooth boundary.

B22t—10 to 18 inches; reddish brown (5YR 5/4) fine sandy loam, reddish brown (5YR 5/4) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine roots; common very fine tubular and many very fine interstitial pores; few thin clay films on faces of peds; 15 percent basalt gravel; neutral; clear wavy boundary.

R—18 inches; lime-coated basalt rock.

Depth to bedrock ranges from 11 to 20 inches. Gravel content ranges from 5 to 25 percent. Cobbles cover 0 to 20 percent of the surface.

The A horizon has value of 5 or 6 dry and chroma of 4 or 6.

The B horizon has value of 5 or 6 dry and chroma of 4 or 6. It is fine sandy loam, sandy loam, or gravelly sandy loam. Clay content ranges from 7 to 18 percent.

Agua series

The Agua series consists of deep, well drained soils that formed in mixed alluvium along the flood plain of the Rio Grande. Slopes are 0 to 1 percent. The average annual precipitation is 8 inches, and the average annual air temperature is 60 degrees F.

Agua soils are similar to the Harkey, Anthony, Vinton, and Anapra soils. Harkey soils are medium textured; Anthony soils, moderately coarse textured; and Vinton soils, coarse textured. Anapra soils are moderately fine textured over coarse textured.

Typical pedon of Agua loam, in Mayfield Agronomy Farm, New Mexico State University, 40 feet NW of irrigation ditch, 1,570 feet south and 1,950 feet west of the NE corner of sec. 28, T. 24 S., R. 2 E.

Ap—0 to 12 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; weak medium granular structure; slightly hard, very friable, nonsticky and nonplastic; no roots; many fine interstitial pores; moderately calcareous; moderately alkaline; clear smooth boundary.

C1—12 to 23 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; massive; slightly hard, very

friable, nonsticky and nonplastic; no roots; many fine interstitial pores; moderately calcareous; moderately alkaline; abrupt wavy boundary.

IIC2—23 to 66 inches; very pale brown (10YR 7/3) fine sand, pale brown (10YR 6/3) moist; single grained; loose dry or moist; nonsticky and nonplastic; no roots; many fine interstitial pores; mildly alkaline.

The Ap horizon is pale brown or light brown loam or clay loam.

The C horizon is pale brown, brown, light brown, light gray, or pinkish gray loam or very fine sandy loam. It is 8 to 18 percent clay.

The IIC horizon is very pale brown, pale brown, light gray, or pink sand or fine sand. This horizon is generally at a depth of 24 to 30 inches, but the range is 20 to 36 inches.

Agua Variant

The Agua Variant consists of deep, somewhat poorly drained soils that formed in mixed alluvium along the flood plain of the Rio Grande. Slopes are 0 to I percent. The average annual precipitation is 8 inches, and the average annual air temperature is 60 degrees F.

Agua Variant soils are similar to the Agua, Harkey, Anthony, Vinton, and Anapra soils. These soils are all well drained. The Harkey soils are medium textured; Anthony soils are moderately coarse textured; and Anapra soils are moderately fine textured over coarse textured.

Typical pedon of Agua Variant fine sandy loam, in an area of Agua Variant and Belen Variant soils, 180 feet south of light pole near west end of racetrack parking lot gate, 1,720 feet S. and 1,510 feet E. of the NW corner of sec. 8, T. 29 S., R. 4 E.

Ap—0 to 13 inches; very pale brown (10YR 7/3) fine sandy loam, pale brown (10YR 6/3) moist; common fine distinct mottles of brownish yellow (10YR 6/6) moist; massive; soft, very friable, nonsticky and nonplastic; many fine and medium roots; few fine interstitial pores; strongly saline; moderately calcareous; moderately alkaline; clear wavy boundary.

C1—13 to 16 inches; light gray (10YR 7/2) very fine sandy loam, brown (10YR 5/3) moist; common fine and few medium distinct mottles of yellowish brown (10YR 5/4) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; many fine and few medium roots; many fine and few tubular pores; strongly saline; moderately calcareous; moderately alkaline; clear smooth boundary.

C2—16 to 23 inches; light brownish gray (10YR 6/2) very fine sandy loam, grayish brown (10YR 5/2) moist; common fine and few medium distinct mottles of yellowish brown (10YR 5/6) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and few fine roots; few fine tubular pores; strongly saline; moderately calcareous; moderately alkaline; clear wavy boundary.

IIC3—23 to 60 inches; very pale brown (10YR 7/3) fine sand, pale brown (10YR 6/3) moist; single grained; loose when dry or moist, nonsticky and nonplastic; few fine roots to a depth of 26 inches; many very fine interstitial pores; noncalcareous; moderately alkaline.

These soils are moderately to strongly saline. The depth to the water table ranges between 12 and 42 inches. Depth to the IIC horizon is 20 to 36 inches.

The A horizon is very pale brown or pale brown.

The C horizon is light gray, light brownish gray, or very pale brown very fine sandy loam or loam.

The IIC horizon is very pale brown or pale brown fine sand and sand.

Akela series

The Akela series consists of shallow, well drained soils that formed in residuum of basalt. The soils are on lava flows and ridges. Slopes are 3 to 25 percent. The average annual precipitation is 8 inches, and the average annual air temperature is 62 degrees F.

The Akela soils are similar to Minlith, Aftaden, and Lozier soils. The Minlith soils are loamy sand in all horizons. The Aftaden soils have an argillic horizon. The Lozier soils have a calcic horizon that is more than 40 percent carbonates.

Typical pedon of Akela gravelly sandy loam, in an area of Akela-Rock outcrop complex, about I mile from the cap, south of El Paso gasline road to pump station, lower SE corner of lava flow from Cinder cone on left side of road near the NW corner of SE1/4 sec. 6, T. 26 S., R. 2 E.

A11—0 to 3 inches; light brown (7.5YR 6/4) gravelly sandy loam, brown (7.5YR 4/4) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; few very fine roots; common fine tubular pores; moderately calcareous; moderately alkaline; abrupt wavy boundary.

A12—3 to 8 inches; light brown (7.5YR 6/4) very gravelly sandy loam, brown (7.5YR 4/4) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; many fine tubular pores; moderately calcareous; moderately alkaline; clear smooth boundary.

Cca—8 to 14 inches; light brown (7.5YR 6/4) very gravelly sandy loam, brown (7.5YR 5/4) moist; massive; slightly hard, very friable, slightly sticky and nonplastic; common fine tubular pores; strongly calcareous, caliche-coated basalt gravel; moderately alkaline; abrupt wavy boundary.

R—14 inches; basalt.

Coarse fragments cover 15 to 35 percent of the surface, and basalt gravel makes up 35 to 65 percent of all horizons. Depth to basalt is 10 to 20 inches.

The A horizon is light brown, brown, light reddish brown, reddish brown, light brownish gray, light grayish brown, or light yellowish brown gravelly sandy loam or very gravelly sandy loam.

The Cca horizon is brown, pinkish gray, light brown, or pink very gravelly loam or very gravelly sandy loam.

Aladdin series

The Aladdin series consists of deep, well drained soils that formed in mixed alluvium along mountain fronts and on fans and terraces. Slopes range from 2 to 10 percent. The average annual precipitation is 11 inches, and the average annual air temperature is 58 degrees F.

The Aladdin soils are associated with Onite, Berino, and Pinaleno soils, all of which have an argillic horizon and do not have a mollic epipedon.

A typical pedon of Aladdin gravelly sandy loam, in an area of Aladdin-Coxwell association, on south bank of arroyo, in the SW1/4SW1/4 sec. 31, T. 21 S., R. 4 E.

On the surface there is a one-half inch layer primarily of loose, angular to subangular monzonite pebbles that are mainly less than one-fourth inch in diameter.

A11—0 to 2 inches, grayish brown (10YR 5/2) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; moderate medium platy structure; slightly hard, friable, nonsticky and nonplastic; common fine roots; noncalcareous; mildly alkaline; abrupt smooth boundary.

A12—2 to 14 inches; dark grayish brown (10YR 4/2) fine gravelly sandy loam, very dark brown (10YR 2/2) moist; massive; slightly hard, friable, nonsticky and nonplastic; common fine roots; few insect burrows 1/4 to 1/2 inch in diameter and few krotovinas 1/2 inch in diameter; noncalcareous; mildly alkaline; clear wavy boundary.

A13—14 to 21 inches; dark grayish brown (10YR 4/2) fine gravelly sandy loam; very dark brown (10YR 2/2) moist; very weak fine subangular blocky structure; hard, friable, nonsticky and nonplastic; common fine roots; few insect burrows and krotovinas; noncalcareous; mildly alkaline; gradual wavy boundary.

A14—21 to 35 inches; dark grayish brown (10YR 4/2) fine gravelly sandy loam, very dark brown (10YR 2/2) moist; very weak fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; few fine roots; few krotovinas; noncalcareous; mildly alkaline; gradual wavy boundary.

A15—35 to 46 inches; dark grayish brown (10YR 4/2) fine gravelly sandy loam, very dark brown (10YR 2/2) moist; generally massive with some portions single grained; slightly hard, friable, nonsticky and nonplastic; few fine roots; noncalcareous; mildly alkaline; gradual wavy boundary.

AC—46 to 58 inches; grayish brown (10YR 5/2) fine gravelly sandy loam, dark brown (7.5YR 3/2) moist; few parts very dark brown (7.5YR 2/2) moist; possibly krotovinas; massive; soft, very friable, nonsticky and nonplastic; few fine roots; noncalcareous; mildly alkaline; irregular boundary.

C—58 to 68 inches; brown (7.5YR 5/3) fine gravelly sandy loam, dark brown (7.5YR 3/3) moist; massive; soft, very friable, nonsticky and nonplastic; few fine roots; noncalcareous; mildly alkaline; gradual irregular boundary.

These soils are noncalcareous to a depth of at least 7 inches and typically are noncalcareous to a depth of several feet.

The A horizon is dark brown, brown, grayish brown, gray, dark gray, dark grayish brown, very dark grayish brown, or very dark gray. The organic matter content is more than 1 percent to a depth of at least 7 inches; it decreases with depth and is less than 1 percent below a depth of 20 inches. Gravel is 15 to 35 percent of the volume.

The C horizon is light brown, brown, dark brown, pale brown, light yellowish brown, yellowish brown, or dark yellowish brown.

Anapra series

The Anapra series consists of deep, well drained soils that formed in mixed alluvium along the Rio Grande. Slopes are 0 to 1 percent. The average annual precipitation is 8 inches, and the average annual air temperature is 62 degrees F.

Anapra soils are similar to Glendale, Armijo, Harkey, Agua, and Vinton soils. Glendale soils are moderately fine textured; Armijo soils, fine textured; Harkey soils, medium textured; Agua soils, medium textured over coarse textured; and Vinton soils, coarse textured.

A typical pedon of Anapra clay loam, 750 feet south and 300 feet east of the NE corner of the SE1/4 sec. 27, T. 26 S., R. 3 E.

Ap—0 to 12 inches; pale brown (10YR 6/3) clay loam, brown (10YR 4/3) moist; weak medium and fine subangular blocky structure; hard, friable, sticky and plastic; common very fine and micro roots; few very fine and micro interstitial pores and root channels; moderately calcareous; moderately alkaline; clear smooth boundary.

C1—12 to 28 inches; pale brown (10YR 6/3) clay loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; hard, friable, sticky and plastic; few very fine and micro roots; few very fine interstitial pores; moderately calcareous; moderately alkaline; abrupt boundary.

IIC2—28 to 60 inches; very pale brown (10YR 7/3) fine sand, brown (10YR 4/3) moist; massive; loose dry and moist, nonsticky and nonplastic; slightly calcareous; mildly alkaline.

The Ap horizon is brown, pale brown, or light brownish gray clay loam, silt loam, or silty clay loam.

The C horizon is very pale brown, pale brown, light brown, or light gray clay loam or silty clay loam and is 27 to 35 percent clay.

The IIC2 horizon is very pale brown, light gray, or pale brown.

Anthony series

The Anthony series consists of deep, well drained soils that formed in recent alluvium along the Rio Grande. Slopes are 0 to 1 percent. The average annual precipitation is 8 inches, and the average annual air temperature is 60 degrees F.

Anthony soils are similar to Vinton, Harkey, and Agua soils. Vinton soils are coarse textured; Harkey soils are medium textured; and Agua soils are medium textured over coarse textured.

Typical pedon of Anthony loam, in an area of Anthony-Vinton loams, 33 feet east of last big tree on south side of road, approximately 100 feet east of entrance to farmstead, 90 feet south into a field, 1,550 feet west and 60 feet south of the NE corner of SE1/4 sec. 27, T. 26 S., R. 3 E.

Ap1—0 to 6 inches; light yellowish brown (10YR 6/4) loam, yellowish brown (10YR 5/4) moist; weak medium and fine subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; few fine and very fine roots; common micro and very fine interstitial and tubular pores; disseminated lime; moderately calcareous; moderately alkaline; clear smooth boundary.

Ap2—6 to 18 inches; light yellowish brown (10YR 6/4) loam, yellowish brown (10YR 5/4) moist; weak medium and fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots; common very fine and micro tubular and interstitial pores; disseminated lime; moderately calcareous; moderately alkaline; clear smooth boundary.

C1—18 to 37 inches; light yellowish brown (10YR 6/4) fine sandy loam, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; no roots; common very fine and micro tubular and interstitial pores; disseminated lime; moderately calcareous; moderately alkaline; clear smooth boundary.

C2—37 to 60 inches; light yellowish brown (10YR 6/4) fine sandy loam, yellowish brown (10YR 5/4) moist; massive; soft, very friable, nonsticky and nonplastic; no roots; few fine and micro tubular and interstitial pores; disseminated lime; moderately calcareous; strongly alkaline.

The Ap horizon is brown or light yellowish brown loam, clay loam, or fine sandy loam.

The C horizon is pale brown, light yellowish brown, or very pale brown fine sandy loam or sandy loam that is less than 18 percent clay and more than 15 percent fine sand and coarser sand. Below a depth of 38 inches, the texture ranges from sand to clay.

Argids

The Argids are shallow to deep, well drained soils on hills and dry mountains. Slopes are 15 to 80 percent. The average annual precipitation is 10 inches, and the average annual air temperature is 60 degrees F.

The soil material is gravelly, cobbly, and stony, coarse to fine alluvium and colluvium.

Argids, cool

Argids, cool, are shallow to deep, well drained soils on the upper slopes of the Organ Mountains. They also occur on north slopes and at lower elevations, in areas that are subject to cool air currents. Slopes range from 15 to 80 percent. The average annual precipitation is 16 inches, and the average annual air temperature is 51 degrees F.

The soil material is gravelly, cobbly, and stony, coarse to fine alluvium and colluvium.

Arizo series

The Arizo series consists of deep, excessively drained soils that formed in mixed alluvium on valley floors of wide arroyos above the Rio Grande Valley. Slopes are 0 to 5 percent. The average annual precipitation is 8 inches, and the average annual air temperature is 60 degrees F.

Arizo soils are similar to Canutio, Bluepoint, Caliza, and Yturbide soils. Canutio soils are loamy-skeletal, Caliza soils have a high calcium carbonate content and are sandy-skeletal, Bluepoint soils are sandy and are less than 15 percent gravel, and Yturbide soils are sandy and are 15 to 35 percent gravel.

Typical pedon of Arizo gravelly sandy loam, in an area of Canutio and Arizo gravelly sandy loams, 365 feet west of access road along Interstate 10 and 0.2 mile northwest of Tucson sign and bridge on Interstate 10, on west side of small gravel pit, 700 feet south and 450 feet east of the NW corner of SE1/4 sec. 3, T. 24 S., R. 2 E.

A1—0 to 15 inches; light brown (7.5YR 6/4) gravelly sandy loam, brown (7.5YR 4/4) moist; weak fine granular structure; slightly hard, very friable, nonsticky and nonplastic; common fine and few medium and coarse roots; few fine tubular and many fine interstitial pores; disseminated lime and few thin patchy coatings on coarse fragments; 20 percent gravel; slightly calcareous; mildly alkaline; abrupt wavy boundary.

C1—15 to 60 inches; pink (7.5YR 7/4) very gravelly sand with pockets and discontinuous lenses up to 3

inches thick of very gravelly loamy sand, brown (7.5YR 4/4) moist; single grained; loose dry and moist; nonsticky and nonplastic; few, medium and coarse roots; many fine interstitial pores; disseminated lime and patchy coatings on coarse fragments; 65 percent gravel, 5 percent cobbles; moderately calcareous; moderately alkaline; abrupt wavy boundary.

Reaction ranges from mildly alkaline to moderately alkaline. Gravel content ranges from 35 to 75 percent.

The A horizon is light brown, brown, pale brown, or light yellowish brown.

The C horizon is pink, very pale brown, pale brown, or light brown very gravelly sand or very gravelly loamy sand.

Armijo series

The Armijo series consists of deep, well drained soils that formed in alluvium in old oxbow lakes or sloughs along the Rio Grande. Slopes are 0 to 1 percent. The average annual precipitation is 8 inches, and the average annual air temperature is 60 degrees F.

Armijo soils are similar to the Belen, Glendale, and Anapra soils. Belen soils are fine textured to a depth of about 30 inches and are medium textured below that depth. Glendale soils are moderately fine textured, and the Anapra soils are moderately fine textured to a depth of 20 to 35 inches and coarse textured below that.

Typical pedon of Armijo clay, 1,470 feet west and 1,030 feet south of the NW corner of the Agronomy Building, New Mexico State University, 200 feet northwest of the SE corner of field and 50 feet north of highway; or 500 feet west and 1,000 feet south of the NE corner of the SW1/4 of sec. 29, T. 23 S., R. 2 E.

Ap—0 to 12 inches; light brownish gray (10YR 6/2) clay, dark brown (10YR 4/3) moist; moderate medium angular and subangular blocky structure; very hard, firm, very sticky and very plastic; common fine roots; many fine interstitial pores; moderately calcareous; strongly alkaline; gradual smooth boundary.

AC—12 to 30 inches; pinkish gray (7.5YR 6/2) clay, brown (7.5YR 5/3) moist; moderate fine angular and subangular blocky structure; very hard, firm, very sticky and very plastic; few fine roots; few fine tubular pores; moderately calcareous; moderately alkaline; clear smooth boundary.

C1—30 to 36 inches; pinkish gray (7.5YR 6/2) silty clay loam, dark brown (7.5YR 4/2) moist; weak fine subangular blocky structure; very hard, friable, sticky and plastic; few fine roots; few fine tubular pores; moderately calcareous; strongly alkaline; clear smooth boundary.

C2—36 to 60 inches; pinkish gray (7.5YR 6/2) clay, dark brown (7.5YR 4/2) moist; weak very fine subangular blocky structure; very hard, firm, very sticky and very plastic; few fine tubular pores; few, fine, distinct lime and soluble salt flecks; moderately calcareous; strongly alkaline.

Cracks 1/2 to 1 inch wide and 20 to 30 inches deep form when these soils are dry. These soils are slightly to moderately saline.

The Ap horizon is brown, grayish brown, light brownish gray, or pinkish gray. It is clay loam, clay, or loam.

The AC and C horizons are brown, light reddish brown, reddish brown, or pinkish gray silty clay loam, silty clay, clay loam, or clay. The content of clay ranges from 35 to 60 percent. Below a depth of 40 inches, the texture ranges from sand to clay.

Belen series

The Belen series consists of deep, well drained soils that formed in alluvium in old oxbow lakes and sloughs along the Rio Grande. Slopes are 0 to 1 percent. The average annual precipitation is 8 inches, and the average annual air temperature is 60 degrees F.

Belen soils are similar to Armijo, Glendale, and Anapra soils. Armijo soils are fine textured; Glendale soils are moderately fine textured. Anapra soils are moderately fine textured to a depth of 20 to 35 inches and coarse textured below that.

Typical pedon of Belen clay, 1,300 feet NW of the SE corner of the NE1/4NW1/4 sec. 25, T. 23 S., R. 1 E., 110 feet from NE corner of field and 15 feet south of the north edge of field, just SW of Las Cruces, off Barker Road.

Ap—0 to 11 inches; brown (7.5YR 5/2) clay, dark brown (7.5YR 4/2) moist; strong medium subangular blocky structure; extremely hard, very firm, very sticky and very plastic; few roots; many very fine and few fine tubular pores; moderately calcareous; moderately alkaline; few fine salt filaments; abrupt smooth boundary.

C1—11 to 24 inches; brown (7.5YR 5/2) clay, dark brown (7.5YR 4/2) moist; strong medium subangular and blocky structure; extremely hard, very firm, very sticky and very plastic; common very fine and fine roots; many very fine and fine tubular pores; moderately calcareous; moderately alkaline; abrupt wavy boundary.

C2—24 to 30 inches; pinkish gray (7.5YR 6/2) silty clay loam, brown (7.5YR 5/2) moist; weak moderately fine and very fine subangular blocky structure; hard, very friable, sticky and plastic; few very fine roots; common fine tubular pores; moderately calcareous; moderately alkaline; clear wavy boundary.

IIC—30 to 35 inches; light yellowish brown (10YR 6/4) very fine sandy loam; yellowish brown (10YR 5/4) moist; massive; soft, very friable; few very fine roots; many very fine tubular pores; moderately calcareous; moderately alkaline; clear wavy boundary.

IIC4—35 to 60 inches; pale brown (10YR 6/3) loamy very fine sand, brown (10YR 5/3) moist; massive; soft, very friable; many very fine interstitial and few fine tubular pores; moderately calcareous; moderately alkaline.

Cracks 1/2 to 1 inch wide and 20 inches or more deep form when these soils are dry. These soils are nonsaline to strongly saline. The depth to contrasting texture is 20 to 36 inches.

The Ap horizon is brown, pale brown, light brown, or grayish brown loam, clay loam, or clay.

The C horizon is brown, light brown, pale brown, or pinkish gray clay, silty clay, clay loam, or silty clay loam that is 40 to 65 percent clay. Mottling ranges from none in the upper part of the C horizon to common in the lower part.

The IIC horizon is brown, pale brown, very pale brown, light yellowish brown, light brown, or pinkish gray loam to loamy very fine sand. In some pedons there is coarse textured material below a depth of 40 inches.

Belen Variant

The Belen Variant consists of deep, somewhat poorly drained soils that formed in alluvium of old oxbow lakes and sloughs along the Rio Grande. Slopes are 0 to 1 percent. The average annual precipitation is 8 inches, and the average annual air temperature is 60 degrees F.

Belen Variant soils are similar to the Belen, Armijo, Glendale, and Anapra soils. Belen, Armijo, and Glendale soils are well drained. The Armijo soils are fine textured; Glendale soils are moderately fine textured. The Anapra soils are moderately fine textured to a depth of 20 to 35 inches and coarse textured below that.

Typical pedon of Belen Variant silty clay in an area of Belen Variant soils, 135 feet east of U.S. Highway 85, 80 feet north of field fence, SE1/4SE1/4SW1/4 of sec. 13, T. 20 S., R. 2 W.

Ap1—0 to 4 inches; brown (7.5YR 5/2) silty clay, dark brown (7.5YR 3/2) moist; weak fine subangular blocky structure; very hard, firm, sticky and plastic; few fine and medium roots; common very fine interstitial and few fine tubular pores; strongly saline; moderately calcareous; strongly alkaline; clear smooth boundary.

Ap2—4 to 14 inches; brown (7.5YR 5/2) clay, dark brown (7.5YR 3/2) moist; massive; very hard, very firm, sticky and plastic; common very fine and few medium roots; common very fine tubular pores; strongly saline; moderately calcareous; strongly alkaline; clear smooth boundary.

C1—14 to 21 inches; light brownish gray (10YR 6/2) silty clay, brown (10YR 4/3) moist; massive; very hard, very firm, sticky and plastic; few fine roots; many very fine tubular pores; moderately calcareous; strongly saline; strongly alkaline; clear smooth boundary.

IIC2—21 to 38 inches; pale brown (10YR 6/3) very fine sandy loam, brown (10YR 4/3) moist; few fine and medium distinct mottles of brownish yellow (10YR 6/6) moist; massive; soft, very friable, slightly sticky and slightly plastic; common very fine interstitial pores; moderately calcareous; strongly alkaline; clear smooth boundary.

IIIC3—38 to 60 inches; very pale brown (10YR 7/3) very fine sand, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; very fine interstitial and few fine tubular pores; moderately calcareous; strongly alkaline.

These soils are moderately saline or strongly saline. The depth to the water table ranges from 12 to 36 inches. The depth to the IIC horizon ranges from 20 to 40 inches.

The A horizon is dark brown, brown, light brown, or pale brown silty clay or clay.

The C horizon is light brownish gray, light brown, or pale brown silty clay or clay.

The IIC horizon is pale brown, very pale brown, or light brown very fine sandy loam, fine sandy loam, or loam.

Berino series

The Berino series consists of deep, well drained soils that formed in alluvium modified by wind. The soils are on fans, piedmont slopes, and valley floors. Slopes are 1 to 5 percent. The average annual precipitation is 8 inches, and the average annual air temperature is 62 degrees F.

The Berino soils are similar to Bucklebar, Dona Ana, and Onite soils. The Bucklebar soils do not have a calcic horizon, Dona Ana soils are calcareous throughout, and the Onite soils are less than 18 percent clay in the control section.

Typical pedon of Berino loamy fine sand, in an area of Berino-Bucklebar association, 2.5 miles north of windmill, 125 feet west of road, on the west side of the SE1/4SE1/4 of sec. 16, T. 20 S., R. 2 E.

A1—0 to 4 inches; brown (7.5YR 5/4) loamy fine sand, dark brown (7.5YR 4/4) moist; moderate very fine granular structure; soft, very friable, nonsticky and nonplastic; very fine roots; neutral; clear smooth boundary.

B1t—4 to 8 inches; reddish brown (5YR 5/4) fine sandy loam, reddish brown (5YR 4/4) moist; moderate very coarse prismatic parting to moderate coarse subangular blocky structure; hard, very friable, nonsticky and nonplastic; few very fine roots; thin reddish coatings on sand grains with some bridging of clay-like material between the grains; mildly alkaline; clear smooth boundary.

B2t—8 to 25 inches; reddish brown (5YR 5/4) sandy clay loam, reddish brown (5YR 4/4) moist; moderate very coarse prismatic parting to moderate coarse

subangular blocky structure; very hard, very friable, slightly sticky and slightly plastic; many very fine roots; many fine and very fine pores; few thin clay films on faces of peds and sand grains and many bridges of clay-like material between sand grains; mildly alkaline; clear smooth boundary.

B3tca—25 to 35 inches; yellowish red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6) moist; moderate coarse subangular blocky structure; very hard, very friable, slightly sticky and slightly plastic; many very fine roots; many very fine pores; few thin clay films on faces of peds; coated sand grains and many bridges of clay-like material between sand grains; calcareous, carbonates segregated as few fine soft masses and as thin filaments or threads; moderately alkaline; gradual wavy boundary.

Cca—35 to 60 inches; pink (5YR 7/4) sandy clay loam; reddish brown (5YR 5/4) moist; very weak coarse subangular blocky structure and in parts massive; extremely hard, friable, slightly sticky and slightly plastic; few very fine roots in upper part; few very fine pores; strongly calcareous with carbonates disseminated throughout and also segregated in medium and large soft masses, concretions, and as filaments; below the upper 1 to 2 feet the carbonates decrease in amount with increasing depth; moderately alkaline.

The solum ranges from 24 to 54 inches in thickness. The depth to the upper boundary of the calcic horizon ranges from 20 to 50 inches.

The A horizon is brown, light reddish brown, reddish brown, reddish yellow, light brown, pale brown, or light yellowish brown loamy fine sand or fine sandy loam.

The B2t horizon is reddish brown, yellowish red, light reddish brown, or reddish yellow sandy clay loam or sandy loam.

The C horizon is pink, light reddish brown, light brown, brown, or pale brown sandy clay loam or sandy loam.

Bluepoint series

The Bluepoint series consists of deep, somewhat excessively drained soils that formed in alluvium modified by wind on fans, terraces, and ridges along the upper margins of the Rio Grande Valley. Slopes are 1 to 40 percent. The average annual precipitation is 8 inches, and the average annual air temperature is 60 degrees F.

The Bluepoint soils are similar to Arizo, Brazito, Pintura, Canutio, Caliza, and Yturbide soils. The Arizo soils are sandy-skeletal, Brazito and Pintura soils are less than 10 percent silt and clay in the control section, Canutio soils are loamy-skeletal, Caliza soils are high in calcium carbonate and are sandy-skeletal, and Yturbide soils are sandy and are 15 to 35 percent gravel.

Typical pedon of Bluepoint loamy sand, 5 to 15 percent slopes, 300 feet east of Interstate 10 right-of-way, directly east of the port of entry, about 3 miles north of Anthony, New Mexico, on Interstate 25; NE1/4SE1/4SW1/4 sec. 2, T. 25 S., R. 3 E.

A1—0 to 18 inches; light brown (7.5YR 6/4) loamy sand, brown (7.5YR 5/4) moist; weak thick platy structure; soft, very friable; few fine roots; many fine interstitial pores; slightly calcareous; mildly alkaline; clear smooth boundary.

C—18 to 60 inches; light brown (7.5YR 6/4) loamy fine sand, brown (7.5YR 5/4) moist; massive; soft, very friable; very few roots; common fine interstitial pores; moderately calcareous containing 1 to 5 percent caliche-coated gravel; moderately alkaline.

The soil is generally calcareous throughout but may be noncalcareous to a depth of 14 inches. The content of gravel ranges from 0 to 15 percent.

The A horizon is light brown, pale brown, light yellowish brown, or brown.

The C horizon is light brown, light yellowish brown, very pale brown, or pale brown. The texture is loamy fine sand or loamy sand but may be sand or fine sand that is more than 10 percent silt plus clay.

Brazito series

The Brazito series consists of deep, well drained soils that formed in mixed alluvium along the banks of the Rio Grande commonly near old or existent river channels. Slopes are 0 to 1 percent. The average annual precipitation is 8 inches, and the average annual air temperature is 60 degrees F.

Brazito soils are similar to Bluepoint and Vinton soils. The Bluepoint soils are more than 10 percent silt and clay throughout the control section; the Vinton soils are loamy sand throughout the profile.

Typical pedon of Brazito loamy fine sand, 500 feet west of the NE corner of sec. 9, T. 23 S., R. 1 E.

Ap—0 to 5 inches; brown (10YR 5/3) loamy fine sand, dark brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; many very fine and micro roots; common very fine and micro interstitial pores; moderately calcareous; moderately alkaline; abrupt wavy boundary.

C1—5 to 60 inches; very pale brown (10YR 7/3) clean, fine sand, brown (10YR 5/3) moist; single grained; loose, nonsticky and nonplastic; few very fine and micro roots; common fine interstitial pores; noncalcareous; moderately alkaline.

Reaction is neutral to moderately alkaline. The control section ranges from noncalcareous to calcareous and is less than 15 percent calcium carbonate.

The Ap horizon is pale brown, brown, grayish brown, or light yellowish brown very fine sandy loam or loamy fine sand.

The C horizon is very pale brown, pale brown, light brownish gray, or light gray fine sand or sand.

Bucklebar series

The Bucklebar series consists of deep, well drained soils that formed in alluvium modified by wind on fans and coalescent fan piedmonts. Slopes are 1 to 5 percent. The average annual precipitation is 8 inches, and the average annual air temperature is 62 degrees F.

The Bucklebar soils are similar to Berino, Dona Ana, and Onite soils. The Berino soils have a calcic horizon at a depth of 24 to 54 inches. Dona Ana soils are calcareous throughout, and the Onite soils are less than 18 percent clay in the control section.

Typical pedon of Bucklebar sandy loam, in an area of Berino-Bucklebar association, on west bank of gully, about 0.1 mile south of U.S. Highway 70, in the SE1/4NE1/4NE1/4 of sec. 18, T. 22 S., R. 3 E.

A2—0 to 2 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 3/3) moist; dominantly weak medium and thin platy structure with few parts weak fine crumb structure; soft, very friable, nonsticky and nonplastic; few roots; few thin (less than 1 mm) lenses; noncalcareous; mildly alkaline; abrupt smooth boundary.

B1t—2 to 6 inches; brown (7.5YR 5/4) sandy loam, dark brown (7.5YR 4/3) moist; weak coarse prismatic structure; hard, very friable, nonsticky and nonplastic; few fine roots; few fine tubular pores with smooth-appearing sides; sand grains and pebbles coated with clay; noncalcareous; mildly alkaline; clear wavy boundary.

B21t—6 to 15 inches; reddish brown (5YR 4/3) sandy clay loam, dark reddish brown (5YR 3/3) moist; weak coarse prismatic structure parting to weak medium subangular blocky; very hard, firm, slightly sticky and plastic; few fine roots; few fine tubular pores; sand grains and pebbles coated with clay; calcareous; moderately alkaline; clear wavy boundary.

B22tca—15 to 25 inches; reddish brown (5YR 5/4) sandy clay loam, reddish brown (5YR 4/4) moist; weak coarse prismatic structure parting to weak coarse subangular blocky; very hard, firm, slightly sticky and plastic; few fine roots; sand grains and pebbles coated with silicate clay; discontinuous carbonate coatings on some peds and pebbles; calcareous; moderately alkaline; clear wavy boundary.

C1ca—25 to 38 inches; light brown (7.5YR 6/4) loam, brown (7.5YR 5/4) moist; few pinkish white (5YR 8/2) carbonate nodules, pink (5YR 7/3) moist; weak medium subangular blocky structure; very hard, friable, slightly sticky and slightly plastic; few fine roots; few fine pores; some pores have carbonate coatings on walls; calcareous; mildly alkaline; clear wavy boundary.

C2ca—38 to 45 inches; light brown (7.5YR 6/4) silty clay loam, brown (7.5YR 5/4) moist; weak medium subangular blocky structure; very hard, friable, sticky and plastic; carbonate on some surfaces of peds and on walls of pores and channels; calcareous; moderately alkaline.

The solum ranges from 20 to 50 inches in thickness. Depth to a weak zone of carbonate accumulations is less than 40 inches. Gravel content is less than 15 percent.

The A horizon is brown, light brown, reddish yellow, pale brown, or light yellowish brown.

The B2t horizon is brown, reddish brown, light reddish brown, red, reddish yellow, or light brown. The texture is sandy clay loam or clay loam and averages 18 to 30 percent clay.

The C horizon is light brown, pink, or brown loam or silty clay loam.

Cacique series

The Cacique series consists of moderately deep, well drained soils that formed in alluvium on level basin floors. Slopes are 0 to 3 percent. The average annual precipitation is 8 inches, and the average annual air temperature is 62 degrees F.

The Cacique soils are similar to Cruces, Casito, and Terino soils. The Cruces soils have a petrocalcic horizon within a depth of 10 to 20 inches; the Casito and Terino soils have a petrocalcic horizon within a depth of 10 to 20 inches, and they have a very gravelly control section.

Typical pedon of Cacique loamy sand, in an area of Cacique-Cruces association, south bank of trench 0.01 mile east of northeast taxiway, Las Cruces Municipal Airport, in the SW1/4SW1/4NE1/4 of sec. 23, T. 23 S., R. 1 W.

A1—0 to 2 inches; reddish brown (5YR 5/4) loamy sand, reddish brown (5YR 4/4) moist; generally massive, weak medium platy structure in some places in upper part; slightly hard, very friable, nonsticky and nonplastic; many very fine and fine interstitial pores; mildly alkaline; abrupt smooth boundary.

B1t—2 to 6 inches; reddish brown (5YR 5/4) sandy loam, reddish brown (5YR 4/4) moist; massive; hard, friable, nonsticky and nonplastic; many very fine and fine interstitial pores; clay coatings on sand grains; mildly alkaline; clear smooth boundary.

B21t—6 to 12 inches; reddish brown (5YR 5/4) sandy clay loam, reddish brown (5YR 4/4) moist; weak coarse prismatic parting to weak medium subangular blocky structure; hard, firm, slightly sticky and plastic; few fine roots; few fine tubular pores; few insect burrows 2 to 10 mm in diameter, some empty and some filled with fine earth; sand grains have coatings of clay; generally noncalcareous with a few discontinuous areas that are weakly calcareous; mildly alkaline; clear smooth boundary.

B22tca—12 to 19 inches; reddish brown (5YR 5/4) sandy clay loam, reddish brown (5YR 4/4) moist;

moderate coarse prismatic parting to weak medium subangular blocky structure; hard, firm, slightly sticky and plastic; few fine roots; few fine tubular pores lined with carbonates; common carbonate filaments on faces of peds; insect burrows 2 to 10 mm in diameter, a few partially empty but most filled with fine earth; clay coatings on sand grains; strongly calcareous; mildly alkaline; clear wavy boundary.

B23tca—19 to 25 inches; variegated reddish brown (5YR 5/4) and pinkish white (7.5YR 8/2) sandy clay loam, reddish brown (5YR 4/4) and pink (7.5YR 7/4) moist; weak coarse prismatic parting to weak medium subangular blocky structure; hard, firm, slightly sticky and plastic; few roots; few fine tubular pores, some of which are lined with carbonates; common carbonate nodules and filaments; sand grains in reddish brown parts are coated with silicate clay; strongly calcareous; moderately alkaline; abrupt smooth boundary.

C1cam—25 to 34 inches; pink (7.5YR 8/4) and white (10YR 8/2) carbonate-cemented material, pink (7.5YR 7/4) and very pale brown (10YR 8/3) moist; alternating subhorizons, 1 mm to 5 cm thick, of laminar carbonate and massively cemented nonlaminar material; very weak very coarse prisms several feet in diameter; extremely hard; reddish yellow (5YR 7/6, 6/6) stainings in upper part, primarily along cleavage planes but in places penetrating the cemented material; sand grains separated by carbonates; strongly calcareous; moderately alkaline; clear wavy boundary.

C2cam—34 to 57 inches; white (10YR 8/2) carbonate-cemented material, very pale brown (10YR 8/3) moist; weak very coarse prisms several feet in diameter; extremely hard; sand grains separated by carbonates; strongly calcareous; mildly alkaline; clear wavy boundary.

C3ca—57 to 76 inches; white (10YR 8/2) carbonate nodules, very pale brown (10YR 8/3) moist; medium and very coarse subangular blocky structure; nodules are very hard and extremely hard and are discontinuously cemented together into clusters; small amount of internodular material that is pink (7.5YR 8/4), light brown (7.5YR 6/4) moist, heavy sandy loam, single grained and loose, nonsticky and nonplastic; strongly calcareous; mildly alkaline; clear wavy boundary.

C4ca—76 to 102 inches; about 70 percent white (10YR 8/2) carbonate nodules, very pale brown (10YR 8/3) moist; medium and very coarse subangular blocky structure; very hard and extremely hard; about 30 percent pink (7.5YR 8/4) sandy loam, light brown (7.5YR 6.4) moist; massive and soft, loose, nonsticky and nonplastic; strongly calcareous; moderately alkaline; clear wavy boundary.

The thickness of the solum and depth to the cemented pan range from 20 to 40 inches. The upper horizons in most places are noncalcareous but range to calcareous throughout.

The A horizon is reddish brown, light reddish brown, brown, light brown, dark brown, pinkish gray, or reddish gray.

The Bt horizon is reddish brown, light reddish brown, brown, or dark brown sandy loam or sandy clay loam.

The Ccam horizon is white, pinkish white, pink, or pinkish gray.

Caliza series

The Caliza series consists of deep, well drained soils that formed in gravelly alluvium on fans or river deposits of Pleistocene age along the upper margins of the Rio Grande Valley. Slopes are 15 to 40 percent. The average annual precipitation is 8 inches, and the average annual air temperature is 60 degrees F.

The Caliza soils are similar to Arizo, Bluepoint, Canutio, and Yturbide soils. The Arizo soils are sandy-skeletal, Bluepoint soils are sandy and are less than 15 percent gravel, Canutio soils are loamy-skeletal, and Yturbide soils are sandy and 15 to 35 percent gravel.

Typical pedon of Caliza very gravelly sandy loam, in an area of Bluepoint-Caliza-Yturbide complex, on the northwest banks of arroyos, in the NE1/4 of sec. 2, T. 22 S., R. 1 E.

A11ca—0 to 1 inch; pinkish gray (7.5YR 6/2) very gravelly sandy loam, dark brown (7.5YR 4/2) moist; moderate medium platy structure, upper 1/8 inch vesicular; soft, very friable, nonsticky and nonplastic; common very fine and fine pores; strongly calcareous; discontinuous carbonate coatings on some pebbles; moderately alkaline; abrupt smooth boundary.

A12ca—1 inch to 7 inches; pinkish gray (7.5YR 6/2) very gravelly sandy loam, brown (7.5YR 4/2) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; common very fine and fine pores; strongly calcareous, thin carbonate coatings on pebbles, mainly on undersides; moderately alkaline; clear smooth boundary.

C1ca—7 to 22 inches; pinkish white (7.5YR 8/2), pinkish gray (7.5YR 7/2) very gravelly sandy loam, pinkish gray (7.5YR 7/2) and brown (7.5YR 5/4) moist; massive; hard, friable, nonsticky and nonplastic; few very fine roots; common very fine and fine pores; strongly calcareous, thick carbonate coatings on pebbles and sand grains; moderately alkaline; clear wavy boundary.

C2ca—22 to 34 inches; pinkish white (7.5YR 8/2) and pinkish gray (7.5YR 7/2) very gravelly loamy sand, pinkish gray (7.5YR 7/2) and brown (7.5YR 5/4) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; common very fine and fine pores; strongly calcareous, continuous and discontinuous carbonate coatings on pebbles; moderately alkaline; clear wavy boundary.

C3—34 to 50 inches; light brown (7.5YR 6/4) very gravelly sand, brown (7.5YR 4/4) moist; scattered discontinuous lenses, 1 to 2 inches thick, of very gravelly loamy sand to light sandy loam; massive; soft, very friable, nonsticky and nonplastic; few very fine pores; few carbonate flakes on pebbles; strongly calcareous; moderately alkaline.

Gravel content ranges from 35 to 70 percent.
The A horizon is pinkish gray or pale brown.
The Cca horizon is pinkish gray, pinkish white, light brown, or very pale brown. Carbonate cementation in this horizon ranges from noncemented to weak and nearly continuous. The horizon does not qualify as a petrocalcic horizon.

Canutio series

The Canutio series consists of deep, well drained soils that formed in mixed alluvium on fans and terraces above the Rio Grande Valley. Slopes range from 1 to 5 percent. The average annual precipitation is 8 inches, and the average annual air temperature is 60 degrees F.

Canutio soils are similar to Arizo, Bluepoint, Caliza, and Yturbide soils. Arizo soils are sandy-skeletal, Bluepoint soils are sandy and are less than 15 percent gravel, Yturbide soils are sandy and are 15 to 35 percent gravel, and Caliza soils have a high lime concentration and are sandy-skeletal.

Typical pedon of Canutio gravelly sandy loam, in an area of Canutio and Arizo gravelly sandy loams, 125 feet north of north concrete curb at Mesquite interchange and 108 feet west of fence, 500 feet east of well, in the NW1/4SE1/4 of sec. 31, T. 24 S., R. 2 E.

A1—0 to 10 inches; light yellowish brown (10YR 6/4) gravelly sandy loam, dark brown (10YR 3/3) moist; soft, very friable, nonsticky and nonplastic; common fine and few medium roots; many fine interstitial pores; disseminated lime and few thin patchy coatings on coarse fragments; 20 percent gravel; slightly calcareous; mildly alkaline; abrupt wavy boundary.

C1—10 to 20 inches; pale brown, (10YR 6/3) very gravelly loamy sand, brown (10YR 4/3) moist; soft, very friable, nonsticky and nonplastic; common fine and few medium roots; many fine and medium interstitial pores; disseminated lime and patchy coatings on coarse fragments; 60 percent gravel; moderately alkaline; abrupt wavy boundary.

C2—20 to 38 inches; pale brown (10YR 6/3) very gravelly sandy loam, brown (10YR 4/3) moist; slightly hard, very friable, nonsticky and nonplastic; few medium roots; common fine interstitial pores; disseminated lime and patchy coatings on coarse fragments; 35 percent gravel (small pockets are as much as 65 percent gravel); moderately calcareous; moderately alkaline; clear smooth boundary.

C3—38 to 60 inches; pale brown (10YR 6/3) gravelly loamy sand, brown (10YR 4/3) moist; slightly hard, very friable; common fine interstitial pores; disseminated lime and patchy coatings on coarse fragments; 35 percent gravel (thin discontinuous strata are as much as 65 percent gravel); moderately calcareous; moderately alkaline.

Gravel content ranges from 35 to 75 percent.
The A horizon is light yellowish brown or pale brown.
The C horizon is pale brown or very pale brown.

Casito series

The Casito series consists of shallow, well drained soils that formed in very gravelly sediments on fans and terraces. Slopes are 1 to 8 percent. The average annual precipitation is 8 inches, and the average annual air temperature is 62 degrees F.

The Casito soils are similar to Terino and Nolam soils. The Terino soils do not have microscopic carbonates in the upper part of the argillic horizon. The Nolam soils are deep and do not have a petrocalcic horizon.

Typical pedon of Casito very gravelly sandy loam, in an area of the Terino-Casito association, on north bank of arroyo, 35 feet south of Dripping Springs Road, in the NE1/4 of sec. 24, T. 23 S., R. 2 E.

A2ca—0 to 2 inches; light brown (7.5YR 6/4) very gravelly sandy loam, brown (7.5YR 5/4) moist; generally massive with some weak medium platy structure in upper part; soft, very friable, nonsticky and nonplastic; few medium roots; calcareous; moderately alkaline; abrupt smooth boundary.

B21tca—2 to 6 inches; reddish brown (5YR 5/4) very gravelly sandy loam, reddish brown (5YR 4/4) moist; weak fine and very fine granular structure; a loose mass of soft, fine granules; few fine roots; coatings of silicate clay on some sand grains and on tops of pebbles; thin discontinuous carbonate coatings on pebbles, mainly on bottoms; calcareous; moderately alkaline; clear wavy boundary.

B22tca—6 to 12 inches; light brown (7.5YR 6/4) very gravelly sandy clay loam, brown (7.5YR 5/4) moist; massive; soft, very friable, slightly sticky and plastic; common fine roots; scattered reddish brown (5YR 5/4) and red (2.5YR 4/6) lenses in which sand grains and pebbles are discontinuously coated with clay; other sand grains and pebbles are coated with carbonates; calcareous; moderately alkaline; abrupt smooth boundary.

C1cam—12 to 18 inches; pink (5YR 7/3) carbonate-cemented material, light reddish brown (5YR 6/4) moist; massive; extremely hard; a few lenses of light brown (7.5YR 6/4) soft loamy material contain the few roots in the horizon; calcareous; moderately alkaline; clear wavy boundary.

C2ca—18 to 28 inches; pinkish white (5YR 8/2) carbonate-cemented material, light reddish brown (5YR 6/3) moist; massive; slightly hard and hard; pockets

and small veins, about 1/4 to 1 inch in diameter, of brown (7.5YR 5/4), moist, loamy material; few medium roots; calcareous; moderately alkaline; abrupt smooth boundary.

IIC3ca—28 to 39 inches; light brown (7.5YR 6/4) sandy loam, brown (7.5YR 5/4) moist; weak medium subangular blocky structure; hard, very friable, nonsticky and plastic; few fine roots; accumulation of carbonate nodules and cylindroids near the middle of the horizon; calcareous; moderately alkaline; abrupt smooth boundary.

IIC4ca—39 to 49 inches; light brown (7.5YR 6/4) very gravelly sandy loam, dark brown (7.5YR 4/4) moist; single grained; loose; very friable, nonsticky and nonplastic; very few soft aggregates of small pebbles; few fine roots; patchy carbonate coatings mainly on undersides of pebbles; calcareous; moderately alkaline; gradual irregular boundary.

IIC5—49 to 60 inches; light brown (7.5YR 6/4) very gravelly loamy sand, dark brown (7.5YR 4/4) moist; single grained; loose, nonsticky and nonplastic; patchy carbonate coatings mainly on undersides of pebbles; calcareous; moderately alkaline.

The solum ranges from 8 to 20 inches in thickness. Coarse fragments make up 35 to 70 percent of the profile.

The A horizon is light reddish brown, reddish brown, pinkish gray, reddish gray, dark reddish gray, brown, dark brown, or light brown. A desert pavement of closely packed angular rhyolite pebbles is on the surface.

The Bt horizon is red, light red, light reddish brown, reddish brown, yellowish red, light brown, or reddish yellow.

The Ccam horizon is pinkish gray, light reddish brown, pinkish white, pink, pinkish gray, reddish yellow, light gray, or very pale brown.

Cave series

The Cave series consists of shallow, well drained soils that formed in gravelly alluvium in old valley fill. Slopes are 1 to 5 percent. The average annual precipitation is 8 inches, and the average annual air temperature is 62 degrees F.

The Cave soils are similar to Simona, Upton, Harrisburg, Tencee, and Nickel soils. The Simona soils have a cambic horizon and are less than 15 percent gravel, Upton soils are carbonatic, Harrisburg soils are moderately deep over indurated caliche, Tencee soils are carbonatic and loamy-skeletal, and Nickel soils do not have a strongly cemented to indurated Ccam horizon.

Typical pedon of Cave gravelly sandy loam in an area of the Cave-Harrisburg association, 0.2 mile south of highway, on east side of road, in the SW corner of the NW1/4 of sec. 32, T. 19 S., R. 4 W.

A11—0 to 5 inches; pale brown (10YR 6/3) gravelly sandy loam, brown (10YR 4/3) moist; weak medium platy structure; slightly hard, very friable, nonsticky and nonplastic; 15 percent hard caliche fragments; moderately calcareous; mildly alkaline; clear smooth boundary.

A12—5 to 10 inches; pale brown (10YR 6/3) gravelly sandy loam, brown (10YR 4/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; 15 percent hard caliche fragments; strongly calcareous; moderately alkaline; clear smooth boundary.

C1ca—10 to 16 inches; very pale brown (10YR 7/3) gravelly sandy loam, brown (10YR 5/3) moist; massive; hard, very friable, nonsticky and nonplastic; 25 percent hard caliche fragments; strongly calcareous; moderately alkaline; clear wavy boundary.

C2cam—16 to 28 inches; indurated caliche that has a thin laminar layer in the upper part.

Depth to the indurated caliche is 4 to 20 inches. Gravel content ranges from 15 to 25 percent.

The A horizon is pale brown, brown, or light yellowish brown.

The Cca horizon is very pale brown or brown.

Coxwell series

The Coxwell series consists of moderately deep, well drained soils that formed in gravelly alluvium over weathered granitic bedrock. Coxwell soils are on ridges along mountain toe slopes. Slopes are 5 to 15 percent. The average annual precipitation is 11 inches, and the average annual air temperature is 50 degrees F.

Coxwell soils are similar to Nolam and Pinaleno soils. Nolam soils are deep and have accumulations of carbonates in the form of coatings and in concentrations sufficient to weakly cement particles and rock fragments together. Pinaleno soils are deep and are less than 0.5 percent organic carbon.

Typical pedon of Coxwell gravelly sandy loam, in an area of the Aladdin-Coxwell association, on U.S. Highway 70, 1 mile east of Observation Park, in road cut on north side of highway, in NW1/4SE1/4SE1/4 sec. 32, T. 21 S., R. 4 E.

—The surface is 50 percent gravel and 10 percent cobblestones.

A1—0 to 3 inches; brown (10YR 5/3) gravelly sandy loam, dark brown (10YR 3/3) moist; weak fine granular structure; slightly hard, very friable, nonsticky and nonplastic; many fine roots; many fine interstitial pores; 30 percent fine angular granitic gravel; neutral; clear, smooth boundary.

B21t—3 to 13 inches; reddish brown (5YR 5/4) gravelly clay loam, reddish brown (5YR 4/4) moist; weak medium prismatic structure parting to weak medium subangular blocky; hard, friable, sticky and slightly plastic; common fine roots; many micro interstitial pores; clay bridges between and coatings on sand grains, clay films line pores; 30 percent fine granitic gravel; neutral; clear wavy boundary.

B22t—13 to 17 inches; reddish yellow (5YR 6/6) gravelly clay loam, yellowish red (5YR 4/6) moist; weak medium subangular blocky structure; hard, friable, sticky and slightly plastic; common fine roots; many micro and fine interstitial pores; clay bridges between and coatings on sand grains, clay films line pores; 40 percent fine angular granitic gravel; neutral; clear wavy boundary.

B31t—17 to 22 inches; reddish yellow (5YR 6/6) extremely gravelly sandy clay loam, yellowish red (5YR 5/6) moist; weak coarse subangular blocky structure; hard, friable, sticky and slightly plastic; few fine roots; common fine interstitial pores; clay coatings on sand grains and clay films lining pores; 60 percent fine angular granitic gravel; neutral; clear wavy boundary.

B32t—22 to 33 inches; reddish yellow (7.5YR 6/6) very gravelly sandy clay loam, strong brown (7.5YR 5/6) moist; weak coarse subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine roots; common fine interstitial pores; few clay coatings on sand grains, clay films line pores; 30 percent fine angular granitic gravel; neutral; clear wavy boundary.

Cr—33 inches; granitic rock weathered to saprolite that parts to individual crystals about 1/4 inch in diameter.

Depth to weathered granite bedrock is 20 to 40 inches.

The A horizon has hue of 7.5YR or 10YR; value of 5 or 6, dry, and 3 or 4, moist; and chroma of 3 or 4.

The B2t horizon has hue of 2.5YR to 7.5YR and value of 4 to 6, dry, and 3, moist. The lower part of the B horizon is noncalcareous to slightly calcareous.

Cruces series

The Cruces series consists of shallow, well drained soils that formed in alluvium on basin floors. Slopes are 0 to 5 percent. The average annual precipitation is 8 inches, and the average annual air temperature is 62 degrees F.

The Cruces soils are similar to Cacique, Casito, and Terino soils. The Cacique soils have a petrocalcic horizon below a depth of 20 inches; the Casito and Terino soils have a very gravelly control section.

Typical pedon of Cruces loamy sand, in an area of the Cacique-Cruces association, on south bank of trench, 800 feet east of northeast taxiway of Las Cruces Municipal Airport, in the SW corner of NE1/4 sec. 23, T. 23 S., R. 1 W.

A1—0 to 2 inches; reddish brown (5YR 5/4) loamy sand, reddish brown (5YR 4/4) moist; weak medium platy structure; soft, very friable, nonsticky and nonplastic; few roots; noncalcareous; mildly alkaline; abrupt smooth boundary.

B1t—2 to 7 inches; reddish brown (5YR 5/4) fine sandy loam, reddish brown (5YR 4/4) moist; weak very coarse prismatic structure; slightly hard, firm, nonsticky and nonplastic; few roots; sand grains coated with silicate clay; noncalcareous; mildly alkaline; clear wavy boundary.

B21t—7 to 12 inches; red (2.5YR 4/6) fine sandy loam, dark red (2.5YR 3/6) moist; weak very coarse prismatic structure that parts to weak medium subangular blocky; slightly hard, firm, nonsticky and nonplastic; few roots; sand grains coated with silicate clay; noncalcareous; mildly alkaline; clear smooth boundary.

B22tca—12 to 14 inches; red (2.5YR 4/6) sandy clay loam, dark red (2.5YR 3/6) moist; weak very coarse prismatic structure that parts to weak medium subangular blocky; hard, firm, slightly sticky and plastic; few roots; sand grains coated with silicate clay; few carbonate filaments; scattered, extremely hard, subangular and rounded, carbonate-cemented fragments about 2 mm to 5 cm in diameter; most parts calcareous, a few parts noncalcareous; moderately alkaline; abrupt smooth boundary.

C1cam—14 to 25 inches; pinkish white (7.5YR 8/2 and 9/2) alternating layers of laminar carbonate-cemented and massive carbonate-cemented material, pink (7.5YR 8/4 and 7/4) moist with some parts pink, light brown, and brown (7.5YR 7/4, 6/4, and 5/4); extremely hard; reddish brown and red stains along cracks; calcareous; moderately alkaline; clear wavy boundary.

C2cam—25 to 40 inches; white (10YR 8/2) and pinkish white (7.5YR 8/2) carbonate-cemented material, light gray (10YR 7/2) and pinkish gray (7.5YR 7/2) moist; massive; extremely hard, sand grains separated by carbonate; strongly calcareous; moderately alkaline; gradual wavy to irregular boundary.

C3ca—40 to 90 inches; white (10YR 8/1) sandy loam, very pale brown (10YR 7/3) moist; matrix is massive and soft; many indurated, extremely hard carbonate nodules; carbonate coatings on nodules and sand grains; strongly calcareous; moderately alkaline; gradual wavy boundary.

C4ca—90 to 124 inches; light gray (10YR 7/2) sandy loam, yellowish brown (10YR 5/4) moist; matrix is massive and soft; few indurated carbonate nodules; carbonate coatings on nodules and sand grains; calcareous; moderately alkaline; gradual wavy boundary.

C5—124 to 140 inches; light brownish gray (10YR 6/2) sand, yellowish brown (10YR 5/4) moist; single grained and massive; loose and soft; noncalcareous; mildly alkaline.

The solum ranges from 8 to 20 inches in thickness.

The A horizon is reddish brown, pinkish gray, light brown, or brown loamy sand, fine sandy loam, or fine sand. In some pedons it is calcareous, but in most

pedons it is noncalcareous. In some pedons there is a thin A2 horizon.

The Bt horizon is red, yellowish red, or reddish brown sandy loam or sandy clay loam that is 12 to 30 percent clay. The upper part of the Bt horizon commonly contains no free carbonates. The middle and lower parts are slightly to strongly calcareous.

The Ccam horizon is pinkish white or white and ranges from a few inches to 6 feet in thickness. This horizon is strongly or violently effervescent, has shallow cracks, and has occasional pipes 1 to 20 feet in diameter. The lower part of the C horizon is white, light gray, very pale brown, or yellowish brown.

Dona Ana series

The Dona Ana series consists of deep, well drained soils that formed in mixed alluvium on fans and piedmonts. Slopes are 1 to 5 percent. The average annual precipitation is 8 inches, and the average annual air temperature is 62 degrees F.

The Dona Ana soils are similar to Berino, Bucklebar, and Onite soils. The Berino soils are not calcareous; Bucklebar soils do not have a calcic horizon; and the Onite soils are less than 18 percent clay in the control section.

Typical pedon of Dona Ana fine sandy loam, in an area of the Berino-Dona Ana association, on south bank of gully, 750 feet south of U.S. Highways 70 and 82, in NE1/4SW1/4NE1/4 sec. 23, T. 22 S., R. 2 E.

A1—0 to 2 inches; reddish brown (5YR 5/3) fine sandy loam, reddish brown (5YR 4/4) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few fine roots, few very fine pores; slightly calcareous, lime generally disseminated but few fine filaments; mildly alkaline; abrupt smooth boundary.

A3—2 to 6 inches; reddish brown (5YR 4/4) sandy loam, dark reddish brown (5YR 3/4) moist; weak medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common fine roots; common very fine pores; slightly calcareous, lime generally disseminated but few fine filaments of lime; mildly alkaline; abrupt smooth boundary.

B21tca—6 to 11 inches; reddish brown (5YR 5/4) sandy clay loam, reddish brown (5YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; few fine pores; some sand grains are coated with clay, others are coated with carbonate; calcareous, lime disseminated and segregated in common filaments and few fine soft bodies; moderately alkaline; clear smooth boundary.

B22tca—11 to 15 inches; reddish brown (5YR 5/4) sandy clay loam, reddish brown (5YR 4/4) moist, some yellowish red (5YR 4/6) in a mosaic pattern (increases in the lower part); moderate fine prismatic and medium and fine subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few fine roots; few fine pores; some sand grains are coated with clay, others are coated with carbonate; calcareous, lime disseminated and in common filaments; moderately alkaline; clear smooth boundary.

B3ca—15 to 20 inches; reddish brown (5YR 5/4) sandy clay loam, reddish brown (5YR 4/4) moist; weak medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few fine roots; few very fine pores; strongly calcareous, many pink (5YR 7/3) carbonate cylindroids and nodules, light reddish brown (5YR 6/4) moist; moderately alkaline; clear smooth boundary.

C1ca—20 to 39 inches; pinkish white (7.5YR 8/2) and light reddish brown (5YR 6/4) sandy clay loam, light brown (7.5YR 6/3) and reddish brown (5YR 5/4) moist; massive; very hard, firm, slightly sticky and slightly plastic; strongly calcareous, many weakly expressed cylindroids; moderately alkaline; gradual wavy boundary.

C2ca—39 to 60 inches; light reddish brown (5YR 6/4) sandy loam, reddish brown (5YR 5/4) moist; massive; hard, firm, slightly sticky and slightly plastic; strongly calcareous, about 60 percent pinkish white (5YR 8/2) carbonate nodules and cylindroids, segregated carbonates decrease with depth; moderately alkaline.

Depth to the calcic horizon ranges from 12 to 30 inches. Strata of gravel and sand are below the control section and calcic horizon in some pedons. Calcium carbonate eqivalent in the lower part of the B horizon or the upper part of the C horizon ranges from 15 to 40 percent and decreases with depth. Dry consistence of the zone of prominent lime accumulation ranges from soft to hard, and some carbonate nodules are indurated.

The A horizon is reddish brown, light reddish brown, light brown, brown, pale brown, or light yellowish brown.

The B2tca horizon is reddish brown, light brown, red, light reddish brown, light brown, or brown. It is sandy clay loam, sandy loam, or loam containing more than 45 percent sand.

The Cca horizon is pinkish white, light reddish brown, reddish brown, or pink sandy loam or sandy clay loam.

Glendale series

The Glendale series consists of deep, well drained soils that formed in mixed alluvium in slightly depressed areas on flood plains and low stream terraces along the Rio Grande. Elevation ranges from 3,700 to 4,120 feet. Slopes are 0 to 1 percent. The average annual precipitation is 8 inches, and the average annual air temperature is 60 degrees F.

Glendale soils are similar to Armijo, Harkey, Anapra, and Belen soils. Armijo soils are fine textured; Harkey soils are medium textured. Anapra soils are moderately

fine textured to a depth of 20 to 35 inches and coarse textured below that. Belen soils are fine textured to a depth of 30 inches and coarse textured below that.

Typical pedon of Glendale clay loam, about 12 miles south of Las Cruces, 50 feet north of edge of field, in SW1/4SW1/4NE1/4 sec. 5, T. 27 S., R. 3 E.

Ap—0 to 12 inches; pale brown (10YR 6/3) clay loam, dark brown (10YR 3/3) moist; weak, medium, and coarse granular structure; hard, friable, sticky and plastic; few fine roots; many fine interstitial pores; moderately calcareous, lime disseminated; moderately alkaline; gradual smooth boundary.

C1—12 to 20 inches; light brownish gray (10YR 6/2) clay loam, dark yellowish brown (10YR 3/4) moist; weak medium subangular blocky structure; hard, friable, sticky and plastic; few fine roots; many fine interstitial and common fine tubular pores; moderately calcareous, lime disseminated; moderately alkaline; gradual smooth boundary.

C2—20 to 34 inches; light yellowish brown (10YR 6/4) clay loam, dark yellowish brown (10YR 3/4) moist; weak medium subangular blocky structure; very hard, friable, sticky and plastic; few fine roots; common very fine interstitial and few fine tubular pores; many very thin strata of silt material; few fine distinct iron flecks in the lower 4 inches; moderately calcareous, lime disseminated; moderately alkaline; abrupt smooth boundary.

C3—34 to 40 inches; pale brown (10YR 6/3) clay loam, dark brown (10YR 3/3) moist; massive; very hard, firm, very sticky and plastic; few fine roots; common microfine interstitial and few fine tubular pores; moderately calcareous, lime disseminated; moderately alkaline; abrupt smooth boundary.

C4—40 to 60 inches; pale brown (10YR 6/3) very fine sandy loam, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine roots in places; few fine interstitial pores; moderately calcareous, lime disseminated; moderately alkaline.

Layers are moderately to highly stratified. Mycelia of lime and salt are present in some pedons.

The Ap horizon is very pale brown, pale brown, light brown, brown, yellowish brown, light brownish gray, or pink loam or clay loam.

The C horizon is very pale brown, light brown, pale brown, brown, light yellowish brown, light reddish brown, grayish brown, yellowish brown, light brownish gray, pinkish gray, reddish gray, light gray, or pink. The texture is stratified loam, silt loam, clay loam, or silty clay loam.

Below a depth of 40 inches, the texture varies from moderately fine to coarse.

Haplargids, dissected

Haplargids, dissected, consists of deep, well drained soils that formed along terminal breaks of piedmont slopes and old fans. Slopes are 10 to 75 percent. The average annual precipitation is 8 inches, and the average annual air temperature is 60 degrees F.

Reference pedon of Haplargids, dissected, on east bank of a cut for a pipeline, in NW1/4NW1/4 sec. 36, T. 23 S., R. 2 E.

A—0 to 1 inch; brown (10YR 5/3) gravelly sandy loam, dark brown (10YR 4/3) moist; weak thick platy structure; soft, friable, nonsticky and nonplastic; few roots; common fine vesicular pores; strongly calcareous; mildly alkaline; abrupt wavy boundary.

C1ca—1 inch to 12 inches; light brown (7.5YR 6/4) very gravelly sandy loam, brown (7.5YR 5/4) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; roots up to 1 cm in diameter common where creosotebush is growing; common fine interstitial pores; most pebbles are partially or wholly coated with carbonate that is white (10YR 8/1) and light gray (10YR 7/2) moist; few loose carbonate-cemented fragments; strongly calcareous; moderately alkaline; abrupt smooth to wavy boundary.

IIB1cab—12 to 23 inches; light brown (7.5YR 6/4) sandy loam, brown (7.5YR 5/4) moist; weak medium subangular blocky structure parting to weak fine granular; soft, very friable, nonsticky and nonplastic; few roots as much as 1/2 cm in diameter; common fine tubular pores; few medium carbonate nodules; pinkish gray (7.5YR 7/2) and light brown (7.5YR 6/4) moist in upper part of horizon; scattered slightly redder and darker parts that are noncalcareous; slightly calcareous; mildly alkaline; abrupt to clear, smooth to wavy boundary.

IIB2cab—23 to 46 inches; light reddish brown (5YR 6/4) loam, reddish brown (5YR 5/4) moist; moderate and strong fine and medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine blocky manganese oxide filaments and spots; few fine roots; common fine tubular pores; thin coatings of reddish brown material on sand grains; interiors of most peds are noncalcareous except for fine carbonate filaments; many ped exteriors are calcareous and white (5YR 8/1) and pinkish gray (5YR 7/2) moist; vertical carbonate veins 2 cm in diameter are common; moderately alkaline; clear wavy boundary.

IIB3cab—46 to 76 inches; light brown (7.5YR 6/4) loam, brown (7.5YR 5/4) moist; medium and coarse moderate subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; no roots; common fine tubular pores; common medium carbonate nodules and cylindroids, white (5YR 8/1) and pinkish gray (5YR 7/2) moist; very hard and strongly calcareous; few black stains on peds; matrix strongly calcareous; moderately alkaline.

On ridge crests the surface horizon commonly consists of a calcium carbonate accumulation that is partly

or completely truncated on narrow ridges. On the sides of ridges are beveled soils that commonly have a buried argillic horizon and a thin mantle of gravelly colluvium about 3 to 9 inches thick. The buried soils differ greatly in texture and composition of coarse fragments. They have reddish brown or brown horizons and horizons of calcium carbonate accumulation and textures of sandy loam to clay that is gravelfree to very gravelly.

Harkey series

The Harkey series consists of deep, well drained soils that formed in alluvium on flood plains and low stream terraces along the Rio Grande. Slopes are 0 to 1 percent. The average annual precipitation is 8 inches, and the average annual air temperature is 60 degrees F.

Harkey soils are similar to Glendale, Agua, Anthony, and Vinton soils. Glendale soils are moderately fine textured; Agua soils are medium textured over coarse textured; Anthony soils are moderately coarse textured; and Vinton soils are coarse textured.

Typical pedon of Harkey loam, about 15 miles south of Las Cruces, 50 feet east of edge of field, in the NW1/4SE1/4NE1/4 of sec. 5, T. 27 S., R. 3 E.

Ap—0 to 18 inches; brown (10YR 5/3) loam, brown (10YR 4/3) moist; weak medium granular structure; slightly hard, very friable, nonsticky and nonplastic; common micro and very fine roots; common very fine and fine interstitial pores; slightly calcareous; moderately alkaline; clear abrupt boundary.

C1—18 to 38 inches; pale brown (10YR 6/3) very fine sandy loam, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; common micro and very fine roots; common very fine and fine interstitial pores; slightly calcareous; moderately alkaline; clear smooth boundary.

C2—38 to 60 inches; brown (10YR 5/3) silt loam, dark brown (10YR 4/3) moist; massive; hard, friable, sticky and plastic; common micro and very fine roots; common very fine and fine interstitial pores; slightly calcareous; moderately alkaline.

The A horizon is pale brown, light brown, or brown clay loam, fine sandy loam, or loam.

The C horizon is light brown, pale brown, brown, light yellowish brown, or yellowish brown very fine sandy loam, loam, or silt loam.

Below a depth of 40 inches the texture ranges from sandy loam to fine sand.

Harrisburg series

The Harrisburg series consists of moderately deep, well drained soils that formed in residuum of sandstone and eolian material from sandstone, volcanic ash, and shale. The soils are on desert mesas. Slopes are 1 to 10 percent. The average annual precipitation is 8 inches, and the average annual air temperature is 62 degrees F.

The Harrisburg soils are similar to Simona and Cave soils. The Simona soils have a petrocalcic horizon within a depth of 20 inches; the Cave soils have a petrocalcic horizon within a depth of 20 inches and are gravelly in the A and C horizons.

Typical pedon of Harrisburg loamy fine sand, in an area of Wink-Harrisburg association, 1 mile northwest along highline on the west side of Jornada Range, 35 feet southwest of road, in NW1/4SE1/4SW1/4 of sec. 25, T. 19 S., R. 1 W.

A1—0 to 4 inches; light brown (7.5YR 6/4) loamy fine sand, brown (7.5YR 4/4) moist; single grained; loose; nonsticky and nonplastic; many very fine roots; many very fine interstitial pores; moderately alkaline; clear smooth boundary.

C1—4 to 17 inches; light reddish brown (5YR 6/4) fine sandy loam, reddish brown (5YR 4/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine roots; many very fine interstitial pores; slightly calcareous; moderately alkaline; clear wavy boundary.

C2ca—17 to 24 inches; light reddish brown (5YR 6/4) fine sandy loam, reddish brown (5YR 4/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine roots; common very fine tubular pores; many very fine interstitial pores; calcareous; moderately alkaline; abrupt wavy boundary.

C3cam—24 to 26 inches; indurated carbonate hardpan.

Depth to the hardpan is 24 to 40 inches.

The A horizon is light brown or light reddish brown loamy fine sand or fine sandy loam.

The C horizon is light reddish brown or reddish brown sandy loam or fine sandy loam.

Lozier series

The Lozier series consists of shallow, well drained soils that formed in material derived from limestone on hills and low mountains. Slopes range from 10 to 50 percent. The average annual precipitation is 8 inches, and the average annual air temperature is 60 degrees F.

The Lozier soils are similar to Akela and Motoqua soils. The Akela soils have a lime content of less than 15 percent in the control section. Motoqua soils have a B2t horizon and average more than 1 percent organic matter in the surface layer.

Typical pedon of Lozier stony loam, in an area of Rock outcrop-Lozier association, near center of NW1/4 sec. 8, T. 21 S., R. 1 E.

A1—0 to 2 inches; pale brown (10YR 6/3) stony loam, brown (10YR 4/3) moist; moderate thin platy structure; slightly hard, friable, nonsticky and nonplastic; common fine roots; common fine vesicular pores; moderately alkaline; strongly calcareous; clear smooth boundary.

C1—2 to 6 inches; light brown (7.5YR 6/4) stony loam, brown (7.5YR 4/4) moist; weak coarse subangular blocky structure; hard, very friable, nonsticky and nonplastic; common fine roots; common very fine interstitial pores; strongly calcareous; moderately alkaline; clear smooth boundary.

C2ca—6 to 11 inches; light brown (7.5YR 6/4) very stony loam, brown (7.5YR 4/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; common fine roots; common very fine interstitial pores; strongly calcareous; moderately alkaline; abrupt wavy boundary.

R—11 inches; limestone bedrock coated with hard caliche to a depth of 1 inch.

Depth to bedrock is 4 to 20 inches. The content of rock fragments ranges from 35 to 75 percent.

The A horizon is pale brown or brown.

The C horizon is light brown, pale brown, or pinkish gray.

Masonfort series

The Masonfort series consists of shallow, well drained soils that formed in calcareous alluvium on uplands. Slopes range from 1 to 15 percent. The average annual precipitation is 8 inches, and the average annual air temperature is 62 degrees F.

Masonfort soils are similar to Lozier soils, and they are near the Nickel, Berino, Dona Ana, and Mimbres soils. The Lozier soils are very gravelly and are shallow to limestone rock. Nickel soils are very gravelly and deep, Berino and Dona Ana soils are medium textured and deep, and Mimbres soils are moderately fine textured and deep.

Typical pedon of Masonfort sandy loam, in an area of the Masonfort-Nickel association, 45 feet south and 150 feet east of the east end of metal cattle guard in road cut on north side of road, in the NW1/4SW1/4NW1/4 of sec. 2, T. 23 S., R. 3 W.

A—0 to 3 inches; brown (10YR 5/3) sandy loam, brown (10YR 4/3) moist; weak thin platy structure; soft, very friable, nonsticky and nonplastic; few fine roots; common fine interstitial and few fine and very fine tubular pores; 10 percent gravel; slightly calcareous; moderately alkaline; clear smooth boundary.

C1ca—3 to 10 inches; light yellowish brown (10YR 6/4) sandy loam, dark yellowish brown (10YR 4/4) moist; weak fine and very fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common fine and few medium roots; common fine interstitial and many fine and very fine tubular pores; 10 percent gravel; strongly calcareous; common fine specks and few medium splotches of calcium carbonate; moderately alkaline; clear wavy boundary.

C2ca—10 to 18 inches; very pale brown (10YR 7/3) gravelly sandy loam, pale brown (10YR 6/3) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few fine and few medium and common very fine roots; many fine tubular pores; 25 percent gravel; strongly calcareous; disseminated lime, common fine spots of calcium carbonate; moderately alkaline; abrupt wavy boundary.

Cr—18 to 60 inches; fractured andesite rock; few fine and few common roots to a depth of 24 inches.

Depth to the fractured andesite rock material is generally 10 to 20 inches. Gravel content ranges from 0 to 35 percent.

The A horizon is pale brown, light brownish gray, very pale brown, or brown.

The Cca horizon is pale brown, light yellowish brown, light brownish gray, very pale brown, or light gray. Carbonates as calcium carbonate equivalent range from 15 to 35 percent.

Mimbres series

The Mimbres series consists of deep, well drained soils that formed in silty sediment that derived from igneous materials. These soils are in slight depressions on broad flood plains or fans. Slopes are 0 to 3 percent. The average annual precipitation is 8 inches, and the average annual air temperature is 62 degrees F.

The Mimbres soils are similar to Adelino and Pajarito soils. The Adelino soils are fine-loamy and are more than 15 percent coarse sand. Pajarito soils are coarse-loamy and are less than 18 percent clay.

Typical pedon of Mimbres silty clay loam, in SE1/4NE1/4 sec. 20, T. 23 S., R. 3 W.

A—0 to 10 inches; pinkish gray (7.5YR 6/2) silty clay loam, dark brown (7.5YR 4/2) moist; weak thin platy structure; slightly hard, very friable, sticky and plastic; many very fine and fine roots; common very fine and fine tubular pores; strongly calcareous; moderately alkaline; clear smooth boundary.

B2—10 to 19 inches; brown (7.5YR 5/2) silty clay loam, dark brown (7.5YR 4/2) moist; weak fine subangular blocky structure; very hard, very friable, sticky and plastic; many very fine roots; many very fine tubular pores; strongly calcareous; moderately alkaline; clear smooth boundary.

C1—19 to 34 inches; pinkish gray (7.5YR 6/2) silty clay loam, dark brown (7.5YR 4/2) moist; massive; hard, very friable, sticky and plastic; many fine and very fine roots; many very fine tubular pores; strongly calcareous; moderately alkaline; gradual boundary.

C2—34 to 60 inches; brown (7.5YR 5/2) silty clay loam, dark brown (7.5YR 3/2) moist; massive; very hard, firm, sticky and plastic; few fine and very fine roots; many very fine and few fine tubular pores; strongly calcareous; moderately alkaline.

The solum ranges from 15 to 40 inches in thickness.

The A horizon is brown, light brown, pinkish gray, yellowish brown, light yellowish brown, grayish brown, or dark grayish brown.

The B horizon is brown, dark brown, light brown, pinkish gray, reddish brown, yellowish brown, or light grayish brown. The texture is silty clay loam, silty loam, or clay loam.

The C horizon is the same color as the B horizon. The texture is silty clay loam or clay loam.

Minlith series

The Minlith series consists of shallow, somewhat excessively drained soils that formed in eolian material and material that weathered from basalt on uplands. Slopes are 0 to 15 percent. The average annual precipitation is 8 inches, and the average annual air temperature is 62 degrees F.

Minlith soils are similar to Aftaden and Akela soils and are near Onite, Pintura, and Pajarito soils. Aftaden soils have a B2t horizon and are loamy, and Akela soils are deep and loamy-skeletal. Onite soils are deep and moderately coarse textured and have an argillic horizon. Pintura soils are deep and sandy. Pajarito soils are deep and moderately coarse textured and have a cambic horizon.

Typical pedon of Minlith loamy sand, in an area of Minlith-Rock outcrop association, in SE1/4SE1/4NE1/4 sec. 17, T. 29 S., R. 3 W., 1 mile east of the west boundary of Mt. Riley along the Mexican Border, at the extra-large border marker:

A1—0 to 3 inches; light reddish brown (5YR 6/4) loamy sand, reddish brown (5YR 5/4) moist; single grained; loose, nonsticky and nonplastic; common very fine roots; many very fine interstitial pores; 10 percent gravel; neutral; abrupt wavy boundary.

C1—3 to 9 inches; reddish brown (5YR 5/4) very gravelly loamy sand, reddish brown (5YR 4/4) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine roots; many very fine interstitial pores; 35 percent gravel, 15 percent cobblestones; neutral; clear smooth boundary.

C2ca—9 to 13 inches; reddish brown (5YR 5/4) very gravelly loamy sand, reddish brown (5YR 4/4) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine roots; many very fine interstitial pores; 50 percent carbonate-coated gravel, 15 percent carbonate-coated cobblestones; moderately calcareous; moderately alkaline; abrupt wavy boundary.

R—13 inches; lime-coated basalt.

Depth to basalt ranges from 10 to 20 inches. The content of rock fragments ranges from 0 to 15 percent in the A horizon and 35 to 65 percent in the C horizon.

The A horizon has hue of 5YR or 7.5YR; value of 5 through 7, dry, and 4 or 5, moist; and chroma of 2 through 4.

The C2ca horizon is as much as 15 percent lime, which ranges from disseminated to some coatings on basalt fragments. The underlying basalt is fractured in some pedons.

Motoqua series

The Motoqua series consists of shallow, well drained soils that formed in alluvium and colluvium that derived from mixed basic igneous bedrock. Slopes range from 13 to 75 percent. The average annual precipitation is 15 inches, and the average annual air temperature is 50 degrees F.

The Motoqua soils are similar to Lozier and Akela soils. The Akela soils are loamy-skeletal. The Lozier soils have carbonatic mineralogy and are underlain by limestone.

Typical pedon of Motoqua cobbly loam, in an area of Motoqua-Rock outcrop association, about 2 miles northwest of the New Mexico State University observatory at Magdalena Peak; in the NE1/4NW1/4 of sec. 32, T. 20 S., R. 3 W.

A1—0 to 2 inches; grayish brown (10YR 5/2) cobbly loam, dark brown (10YR 3/3) moist; weak medium crumb structure; soft, friable, sticky and plastic; common fine roots; many fine tubular pores; neutral; clear smooth boundary.

B21t—2 to 7 1/2 inches; dark grayish brown (10YR 4/2) cobbly silt loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; many fine roots; many fine tubular and interstitial pores; neutral; clear wavy boundary.

B22t—7 1/2 to 14 inches; grayish brown (10YR 5/2) cobbly silt loam, dark grayish brown (10YR 4/2) moist; weak medium prismatic structure parting to moderate medium subangular blocky; hard, firm, sticky and plastic; common fine roots; many tubular and interstitial pores; neutral; clear smooth boundary.

B23tca—14 to 20 inches; grayish brown (10YR 5/2) cobbly silt loam, dark brown (10YR 4/3) moist; moderate coarse subangular blocky structure; hard, very firm, sticky and plastic; common fine roots; many fine tubular pores; slightly calcareous; neutral; clear wavy boundary.

R—20 inches; basalt; the first few inches are fractured.

Depth to bedrock ranges from 10 to 20 inches. The surface cover is 35 to 50 percent cobblestones, 15 to 20 percent gravel, and as much as 20 percent stones. Coarse fragments make up 35 to 55 percent of the profile.

The A horizon is grayish brown or dark grayish brown.

The B2t horizon is reddish brown, brown, grayish brown, dark grayish brown, or very dark grayish brown.

Nickel series

The Nickel series consists of deep, well drained soils that formed in very gravelly alluvium on the sides of strongly dissected terraces and ridges. Slopes are 3 to 15 percent. The average annual precipitation is 8 inches, and the average annual air temperature is 62 degrees F.

The Nickel soils are similar to Tencee and Lozier soils. The Tencee soils are carbonatic and have a petrocalcic horizon within a depth of 20 inches. The Lozier soils are carbonatic and have a lithic contact within a depth of 20 inches.

Typical pedon of Nickel very gravelly fine sandy loam, in an area of Nickel-Upton association, west of Hatch, in the SE corner of the SE1/4SE1/4NW1/4 of sec. 20, T. 10 S., R. 3 W.

A11—0 to 2 inches; light brownish gray (10YR 6/2) very gravelly fine sandy loam, grayish brown (10YR 5/2) moist; weak medium platy structure; slightly hard, very friable, nonsticky and nonplastic; few fine roots; common fine vesicular pores; moderately calcareous; patchy carbonate coatings on pebbles; moderately alkaline; clear smooth boundary.

A12—2 to 5 inches; pinkish gray (7.5YR 6/3) very gravelly fine sandy loam, dark brown (7.5YR 4/3) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few fine roots; common fine interstitial pores; moderately calcareous; patchy carbonate coatings on pebbles; moderately alkaline; clear wavy boundary.

C1—5 to 12 inches; pale brown (10YR 6/3) very gravelly sandy loam, brown (10YR 5/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine roots; common fine interstitial pores; strongly calcareous; nearly continuous coatings on coarse fragments; moderately alkaline; clear wavy boundary.

C2ca—12 to 22 inches; white (10YR 8/2) very gravelly sandy loam, light gray (10YR 7/2) moist; massive; hard, very friable, nonsticky and nonplastic; few very fine interstitial pores; strongly calcareous; weak cementation of carbonates and gravel; moderately alkaline; clear wavy boundary.

C3—22 to 60 inches; pale brown (10YR 6/3) very gravelly sandy loam, brown (10YR 5/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; common fine interstitial pores; strongly calcareous; patchy coatings of carbonate on coarse fragments; moderately alkaline.

Coarse fragments make up 10 to 40 percent of the surface cover and 35 to 70 percent of the profile.

The A horizon is light brownish gray, light brown, pale brown, very pale brown, light gray, or pinkish gray very gravelly fine sandy loam or very gravelly sandy loam.

The C horizon is white, light gray, pinkish white, pale brown, or pinkish gray very gravelly fine sandy loam or gravelly sandy loam.

Nolam series

The Nolam series consists of deep, well drained soils that formed in alluvium derived from igneous rock on fans and terraces. Slopes are 2 to 10 percent. The average annual precipitation is 8 inches, and the average annual air temperature is 62 degrees F.

The Nolam soils are similar to Pinaleno, Casito, and Terino soils. The Pinaleno soils do not have a calcic horizon within a depth of 40 inches and are less than 1 percent organic matter. Casito and Terino soils have petrocalcic horizons.

Typical pedon of Nolam very gravelly fine sandy loam, in an area of Pinaleno-Nolam association, 200 feet west of Soledad Canyon Road, on south bank of arroyo, in NE1/4NE1/4SE1/4 sec. 21, T. 23 S., R. 3 E.

A2—0 to 2 inches; light brown (7.5YR 6/4) very gravelly fine sandy loam, brown (7.5YR 5/4) moist; weak fine crumb structure; soft, very friable, nonsticky and nonplastic; few medium roots; mildly alkaline; abrupt smooth boundary.

B21t—2 to 10 inches; red (2.5YR 4/6) very gravelly sandy clay loam, dark red (2.5YR 3/6) moist; hue is 5YR in some spots; weak medium and coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; pebbles and sand grains thickly coated with clay; mildly alkaline; clear wavy boundary.

B22tca—10 to 17 inches; dominantly reddish brown (5YR 5/4) very gravelly sandy clay loam, reddish brown (5YR 4/4) moist; some spots have hue of 7.5YR, particularly in the lower part; massive; soft, very friable, slightly sticky and slightly plastic; common fine roots; silicate clay coatings on some sand grains and pebbles, primarily on upper sides of pebbles in upper half of horizon, fewer in lower half; calcareous; moderately alkaline; abrupt wavy boundary.

C1ca—17 to 24 inches; dominantly pink (7.5YR 8/4) very gravelly sandy loam, pink (7.5YR 7/4) moist; massive; slightly hard with a few hard parts, friable, nonsticky and nonplastic; few fine roots; most pebbles are separated by carbonates; a few reddish brown parts; calcareous; moderately alkaline; clear wavy boundary.

C2ca—24 to 40 inches; mixed pink (7.5YR 8/4) and light brown (7.5YR 6/4) very gravelly sandy loam, light brown (7.5YR 6/4) and brown (7.5YR 5/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine roots; carbonate thickly coats pebbles in light colored parts and thinly coats them in darker parts; light and dark parts occur in nearly vertical tongues and in irregular volumes, 1 inch to

several inches across; calcareous; moderately alkaline; clear wavy boundary.

C3ca—40 to 52 inches; alternating tongues and lenses of very pale brown (10YR 7/4) and brown (7.5YR 5/4) very gravelly loamy sand, yellowish brown (10YR 5/4) and dark yellowish brown (7.5YR 4/4) moist; massive; soft, slightly hard, very friable; few fine roots; light colored parts commonly held together by weak carbonate cementation, darker parts have only thin carbonate coatings; calcareous; moderately alkaline; clear wavy boundary.

C4ca—52 to 71 inches; dominantly brown (7.5YR 5/4) very gravelly sand, dark brown (7.5YR 4/4) moist; massive; soft and slightly hard, very friable; few fine roots; few tongues and lenses of pink (7.5YR 8/4), light brown (7.5YR 6/4) moist; material weakly held together by carbonate; moderately alkaline; clear wavy boundary.

The upper boundary of the calcic horizon is within a depth of 40 inches. The content of organic carbon ranges from 0.5 to 1.0 percent within a depth of 15 inches.

The A horizon is light brown, light reddish brown, reddish brown, dark reddish gray, reddish gray, or brown.

The B2t horizon is red, reddish brown, light reddish brown, light red, or yellowish red. The texture is very gravelly sandy clay loam or very gravelly sandy loam with 18 to 35 percent clay.

The Cca horizon is pink, very pale brown, white, light gray, brown, pale brown, pinkish white, pinkish gray, light brown, or light reddish brown. Development of the Cca horizon ranges from a few clusters of carbonate-cemented pebbles to discontinuous induration. Carbonate content gradually decreases with depth.

Onite series

The Onite series consists of deep, well drained soils that formed in alluvium on fans. Slopes are 1 to 5 percent. The average annual precipitation is 8 inches, and the average annual air temperature is 62 degrees F.

The Onite soils are similar to Berino, Bucklebar, Dona Ana, and Pajarito soils, which are 18 to 35 percent clay in the control section. Pajarito soils do not have a B2t horizon.

Typical pedon of Onite loamy sand in an area of Onite-Pajarito association, between power lines, in the NE1/4SE1/4NW1/4 of sec. 5, T. 24 S., R. 3 E.

A1—0 to 5 inches; light reddish brown (5YR 6/4) loamy sand, dark reddish brown (5YR 3/4) moist; weak medium platy structure; soft, very friable, nonsticky and nonplastic; few fine roots; common fine pores; mildly alkaline; clear smooth boundary.

B2t—5 to 12 inches; reddish brown (5YR 5/4) sandy loam, dark reddish brown (5YR 3/4) moist; weak coarse subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common fine pores; sand grains and a few pebbles are thinly coated with reddish clay; slightly calcareous; mildly alkaline; clear smooth boundary.

B3tca—12 to 18 inches; light reddish brown (5YR 6/4) sandy loam, reddish brown (5YR 4/4) moist; weak coarse subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common fine roots; common fine pores; few medium soft calcium carbonate masses and threads; sand grains and a few pebbles have thin, discontinuous carbonate coatings; moderately calcareous; moderately alkaline; clear smooth boundary.

C1ca—18 to 25 inches; light reddish brown (5YR 6/4) loamy sand, reddish brown (5YR 5/4) moist; massive; slightly hard, very friable; few fine roots; common fine pores; common medium soft calcium carbonate masses and threads; sand grains and pebbles have thin nearly continuous carbonate coatings; strongly calcareous; moderately alkaline; clear smooth boundary.

C2—25 to 60 inches; light reddish brown (5YR 6/4) loamy sand, reddish brown (5YR 4/4) moist; massive; soft, very friable; common fine pores; strongly calcareous; sand and pebbles have thin, discontinuous carbonate coatings; 5 to 15 percent mixed igneous gravel; moderately alkaline.

The solum ranges from 12 to 28 inches in thickness. Gravel content ranges from 0 to 15 percent; in some pedons, the range may extend to 20 percent in the solum and to 35 percent below the solum.

The A horizon is light reddish brown, brown, or reddish brown loamy sand or loamy fine sand.

The B2t horizon is reddish brown, brown, or light reddish brown.

The Cca horizon is light reddish brown, brown, light brown, pink, reddish brown, pale brown, very pale brown, or yellowish red. The texture is loamy sand, sandy loam, or gravelly sandy loam.

Pajarito series

The Pajarito series consists of deep, well drained soils that formed in mixed alluvium that has been modified by wind. These soils are on fans below the margins of piedmonts and on fans on piedmonts. Slopes are 0 to 3 percent. The average annual precipitation is 8 inches, and the average annual air temperature is 60 degrees F.

Pajarito soils are similar to Onite, Pintura, and Mimbres soils. The Onite soils are moderately coarse textured and have a B2t horizon, Pintura soils are coarse textured and do not have a B horizon, and Mimbres soils are moderately fine textured and are high in silt.

Typical pedon of Pajarito fine sandy loam, 12 feet southwest of twin power poles on old highway, 700 feet west of present road to Ft. Seldon, and 0.2 mile west of Ft. Seldon interchange on Interstate 25, Dona Ana County; NW1/4SW1/4 sec. 12, T. 21 S., R. 1 W.

Ap—0 to 12 inches; light brown (7.5YR 6/4) fine sandy loam, brown (7.5YR 5/4) moist; weak medium and fine granular structure; soft, very friable, nonsticky and nonplastic; no roots; many fine interstitial pores; few calcium-coated pebbles; moderately calcareous; calcium carbonate disseminated; few fine specks of calcium carbonate, moderately alkaline; clear smooth boundary.

B2—12 to 24 inches; reddish yellow (7.5YR 6/6) fine sandy loam, strong brown (7.5YR 5/6) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few medium and fine roots; many fine interstitial and tubular pores; moderately calcareous; calcium carbonate disseminated with few specks of calcium carbonate; moderately alkaline; abrupt smooth boundary.

B3ca—24 to 28 inches; yellowish red (5YR 5/6) fine sandy loam, yellowish red (5YR 4/6) moist; moderate medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few fine roots; many fine tubular pores; few caliche-coated pebbles; strongly calcareous; calcium carbonate disseminated, common faint spots and seams; moderately alkaline; clear smooth boundary.

C1ca—28 to 40 inches; yellowish red (5YR 5/6) fine sandy loam, yellowish red (5YR 4/6) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few medium and fine roots to a depth of 36 inches; many fine interstitial pores; moderately calcareous; many fine soft masses of calcium carbonate; moderately alkaline; abrupt smooth boundary.

C2—40 to 46 inches; yellowish red (5YR 5/6) fine sandy loam, yellowish red (5YR 5/6) moist; weak fine subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; no roots; common fine tubular pores; moderately calcareous; few spots and splotches of calcium carbonate; moderately alkaline; clear smooth boundary.

C3—46 to 52 inches; yellowish red (5YR 5/6) fine sandy loam, yellowish red (5YR 4/6) moist; weak fine subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few fine tubular pores; moderately calcareous; few fine spots and splotches of calcium carbonate; moderately alkaline; abrupt smooth boundary.

C4—52 to 60 inches; light red (2.5YR 6/6) fine sandy loam, red (2.5YR 5/6) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few fine tubular and common fine intersititat pores; slightly calcareous; few fine specks of calcium carbonate and few pebbles; moderately alkaline.

The A horizon is light brown or reddish brown loamy fine sand or fine sandy loam.

The B horizon is reddish yellow, yellowish red, light brown, or brown fine sandy loam or sandy loam.

The C horizon is yellowish red, light brown, or brown fine sandy loam, loamy very fine sand, or sandy loam.

Pinaleno series

The Pinaleno series consists of deep, well drained soils that formed in alluvium on fans, fan piedmonts, and terraces. Slopes are 1 to 10 percent. The average annual precipitation is 8 inches, and the average annual air temperature is 62 degrees F.

The Pinaleno soils are similar to the Nolam, Casito, and Terino soils. In the Nolam soils the upper boundary of the calcic horizon is within a depth of 40 inches, and the content of organic carbon is 0.5 to 1.0 percent within a depth of 15 inches from the surface. Casito and Terino soils have petrocalcic horizons.

Typical pedon of Pinaleno very gravelly sandy loam, in an area of Pinaleno-Nolam association, about 0.1 mile north of an arroyo, in the NE1/4NE1/4NE1/4 of sec. 21, T. 23 S., R. 3 E.

A2—0 to 2 inches; brown (7.5YR 5/4) very gravelly sandy loam, dark brown (7.5YR 4/3) moist; weak medium platy and weak very fine crumb structure; soft, very friable, nonsticky and nonplastic; few roots; the upper 1/8 inch of the horizon is light brownish gray (10YR 6/2) dry or dark grayish brown (10YR 4/2) moist and is vesicular at the surface; noncalcareous; neutral; abrupt smooth boundary.

B1t—2 to 7 inches; reddish brown (5YR 5/4) very gravelly sandy loam, dark reddish brown (5YR 3/4) moist; weak fine and medium crumb structure; soft and slightly hard, very friable, nonsticky and nonplastic; common roots; pebbles have faint reddish stains; noncalcareous; mildly alkaline; clear smooth boundary.

B2t—7 to 12 inches; reddish brown (5YR 5/4) very gravelly sandy loam, dark reddish brown (5YR 3/4) moist; weak fine and medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; few roots; sand grains and pebbles have thin, reddish clay coatings; few insect tunnels, with smooth linings, 0.5 to 2.0 cm in diameter; noncalcareous; mildly alkaline; clear smooth boundary.

B3t—12 to 20 inches; brown (7.5YR 5/4) very gravelly sandy loam, dark brown (7.5YR 3/4) moist; weak medium subangular blocky structure; slightly hard; friable, nonsticky and nonplastic; few roots; discontinuous brown stains on pebbles; generally noncalcareous with some weak effervescence in lower part; mildly alkaline; abrupt wavy boundary.

C1ca—20 to 28 inches; light yellowish brown (10YR 6/4) very gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; pebbles are mainly 1 inch in diameter; single grained; soft, very friable, nonsticky and nonplastic; few roots; thin, discontinuous carbonate coatings on pebbles, mainly on undersides; weakly stratified; most pebble interstices filled or

nearly filled with loose fine earth; effervesces strongly; moderately alkaline; clear wavy boundary.

C2ca—28 to 37 inches; light brown (7.5YR 6/4) very gravelly sandy loam, brown (7.5YR 5/4) moist; massive; soft to hard, very friable, nonsticky and nonplastic; no roots; upper 5 or 6 cm of this horizon consists mainly of fine pebbles 1 inch in diameter; most pebble interstices are filled with tightly packed fine earth, except for upper 5 to 8 cm of the horizon which has loose fine earth; thin, discontinuous and filamentous carbonate coatings on pebbles and in fine earth; effervesces strongly; moderately alkaline; clear wavy boundary.

C3—37 to 60 inches; yellowish brown (10YR 5/4) very gravelly loamy sand, dark yellowish brown (10YR 4/4) moist; single grained; soft, loose; few patchy carbonate coatings on bottoms of some pebbles; many interstices between pebbles are empty or nearly so; weakly stratified, with occasional, indistinct fine-earth strata, 1/2 to 1/4 inch thick; noncalcareous or effervesces weakly; moderately alkaline; abrupt wavy boundary.

The solum ranges from 15 to 40 inches in thickness. These soils are noncalcareous in the upper part of the solum and are calcareous in some places in the lower part. The content of organic matter is less than 1 percent within a depth of 15 inches.

The A horizon is brown, light reddish brown, reddish brown, or light brown.

The B2t horizon is reddish brown, brown, light reddish brown, or light brown very gravelly sandy loam or very gravelly sandy clay loam.

The C horizon is light brown, light yellowish brown, yellowish brown, or reddish brown.

Pintura series

The Pintura series consists of deep, somewhat excessively drained soils that formed in eolian material on broad fans. Slopes are 1 to 5 percent. The average annual precipitation is 8 inches, and the average annual air temperature is 62 degrees F.

Pintura soils are similar to Bluepoint, Brazito, and Yturbide soils. Bluepoint soils are calcareous throughout, Brazito soils are less than 10 percent silt plus clay, and Yturbide soils are 15 to 35 percent coarse fragments.

Typical pedon of Pintura fine sand in an area of Wink-Pintura complex, 4 1/4 miles east of More on Stran road, 10 feet south of road, in the NW1/4NW1/4NW1/4 of sec. 6, T. 29 S., R. 2 E.

A1—0 to 8 inches; light brown (7.5YR 6/4) fine sand, brown (7.5YR 5/4) moist; single grained; loose, nonsticky and nonplastic; many medium and fine roots; many fine interstitial pores; noncalcareous; mildly alkaline; clear smooth boundary.

C—8 to 60 inches; light brown (7.5YR 6/4) fine sand, brown (7.5YR 5/4) moist; massive; loose, nonsticky and nonplastic; many fine roots; many fine interstitial pores; noncalcareous; mildly alkaline.

The A and C horizons are light brown or brown fine sand, loamy sand, or loamy fine sand.

Reagan series

The Reagan series consists of deep, well drained soils that formed in alluvium on fans and basin floors. Slopes are 1 to 3 percent. The average annual precipitation is 8 inches, and the average annual air temperature is 62 degrees F.

The Reagan soils are similar to Dona Ana and Mimbres soils. The Dona Ana soils have a B2t horizon. The Mimbres soils do not have a calcic horizon.

Typical pedon of Reagan clay loam, in an area of Dona Ana-Reagan association, 0.6 mile north and 1.5 miles west of the SE corner of NE1/4SE1/4 sec. 10, T. 21 S., R. 2 E.

A—0 to 2 inches; pinkish gray (7.5YR 6/2) clay loam, brown (7.5YR 4.5/2) moist; weak thick platy structure; slightly hard, friable, sticky and plastic; common roots; effervesces strongly; moderately alkaline; abrupt smooth boundary.

B21—2 to 9 inches; light brown (7.5YR 6/3) clay loam, brown (7.5YR 4.5/3) moist; very weak coarse prismatic structure breaking to moderate medium subangular blocky; hard, firm, sticky and plastic; common roots; cicada burrows about 1/4 inch in diameter, some of which extend laterally for several inches; some burrows are empty, others are filled with loose material that may be the same color as the horizon, or darker; burrows have smooth, thin linings; effervesces strongly; moderately alkaline; clear wavy boundary.

B22—9 to 16 inches; brown (7.5YR 5.5/4) clay loam, brown (7.5YR 4/4) moist; very weak medium prismatic structure parting to moderate medium subangular blocky; hard, firm, sticky and plastic; common roots; cicada burrows as above; effervesces strongly; moderately alkaline; clear wavy boundary.

B23—16 to 23 inches; light brown (7.5YR 6/4) silty clay loam, brown (7.5YR 5/4) moist; upper part weak medium subangular blocky structure; hard, firm, sticky and plastic; few roots; few carbonate nodules in lower part; some empty and some filled cicada burrows about 1/4 inch in diameter; moderately alkaline; clear smooth boundary.

B24ca—23 to 34 inches; pink (7.5YR 7/4) silty clay loam, light brown (7.5YR 6/4) moist; common nodules of pinkish white (7.5YR 8/2) dry or light brown (7.5YR 6/4) moist; very weak medium and coarse subangular blocky structure; slightly hard and hard, firm, sticky and plastic; few fine roots; effervesces strongly; moderately alkaline; clear wavy boundary.

B25ca—34 to 48 inches; light brown (7.5YR 6/4) clay loam, brown (7.5YR 5.5/4) moist; moderate fine and

medium subangular blocky structure; slightly hard and hard, firm, sticky and plastic; very few fine roots; very few carbonate nodules or cylindroids; effervesces strongly; moderately alkaline; clear wavy boundary.

B26ca—48 to 57 inches; light brown (7.5YR 5/4) moist; weak medium and coarse prismatic structure parting to weak medium subangular blocky; slightly hard, friable, sticky and plastic; very few fine roots; few fine tubular pores; few apparent burrow fillings shaped like cicada burrows; effervesces strongly; moderately alkaline; clear wavy boundary.

C—57 to 71 inches; light brown (7.5YR 6/4) sandy clay loam, brown (7.5YR 5/4) moist; few parts reddish brown (5YR 5/4) dry; generally massive but weak medium subangular blocky structure in some parts; hard, firm, slightly sticky and plastic; very few fine roots; effervesces strongly; moderately alkaline; clear smooth boundary.

Content of organic carbon is 0.5 to 1.0 percent within a depth of 15 inches. Content of calcium carbonate ranges from 15 to 40 percent. The 10- to 40-inch control section is 18 to 35 percent clay and less than 15 percent is coarser than very fine sand.

The A horizon is pinkish gray, light brownish gray, or grayish brown.

The B horizon is light brown, brown, pinkish gray, or light reddish brown.

The C horizon is brown, light brown, or pink silty clay loam, clay loam, or sandy clay loam.

Simona series

The Simona series consists of shallow, well drained, level to undulating soils that formed in calcareous sandy eolian material on plains, mesa tops, and low ridges. Slopes are 1 to 10 percent. The average annual precipitation is 8 inches, and the average annual air temperature is 62 degrees F.

The Simona soils are similar to Harrisburg, Tencee, and Upton soils. The Harrisburg soils have a petrocalcic layer below a depth of 20 inches, Tencee soils are very gravelly in the control section and are more than 40 percent carbonates, and Upton soils are more than 40 percent carbonates in the control section.

Typical pedon of Simona sandy loam in an area of Simona- Harrisburg association, about 500 feet northeast of fence, on north side of road, in the NW1/4SE1/4SE1/4 of sec. 29, T. 24 S., R. 1 W.

A1—0 to 2 inches; light brown (7.5YR 6/4) sandy loam, brown (7.5YR 4/4) moist; weak medium platy structure; slightly hard, very friable, nonsticky and nonplastic; few fine roots; few fine and very fine tubular pores; slightly calcareous; moderately alkaline; clear smooth boundary.

B2—2 to 8 inches; light brown (7.5YR 6/4) sandy loam, brown (7.5YR 4/4) moist; weak coarse subangular blocky structure; hard, very friable, nonsticky and nonplastic; few fine roots; common fine interstitial pores; moderately calcareous; moderately alkaline; clear smooth boundary.

C1ca—8 to 12 inches; pinkish white (7.5YR 8/2) sandy loam; pinkish gray (7.5YR 6/2) moist; massive; hard, friable, slightly sticky and nonplastic; few fine roots; common very fine interstitial pores; strongly calcareous; disseminated lime with 10 percent hard caliche gravel; moderately alkaline; abrupt wavy boundary.

C2cam—12 to 20 inches; indurated carbonate hardpan.

The solum thickness and depth to the hardpan are 7 to 20 inches.

The A horizon is light reddish brown, reddish gray, pinkish gray, brown, pale brown, grayish brown, or light brown sandy loam or loamy sand.

The B horizon is light reddish brown, reddish gray, pinkish gray, brown, light brown, grayish brown, or light yellowish brown.

The Ccam horizon is pink, pinkish white, or white.

Stellar series

The Stellar series consists of deep, well drained soils that formed in sediments derived from igneous rock on basin floors and on toe slopes of fans. Slopes are 0 to 3 percent. The average annual precipitation is 8 inches, and the average annual air temperature is 60 degrees F.

The Stellar soils are similar to Berino, Dona Ana, Bucklebar, Pinaleno, and Nolam soils. The Berino, Dona Ana, and Bucklebar soils are 18 to 35 percent clay in the control section. Pinaleno and Nolam soils are more than 35 percent gravel in the control section.

Typical pedon of Stellar clay loam in an area of Stellar association, 400 feet west of Jornada Road, in the SE1/4NE1/4SW1/4 of sec. 4, T. 21 S., R. 2 E.

A2—0 to 3 inches; pinkish gray (7.5YR 6/2) clay loam, dark brown (7.5YR 4/3) moist; desiccation cracks 1/2 to 1 cm wide at surface become narrower with depth and form prisms 5 to 10 cm in diameter; prisms have moderate medium platy structure in upper part grading to weak thick platy in lower part; slightly hard, friable, sticky and plastic; many roots; few tubular insect burrows 1 to 2 mm in diameter; weakly calcareous; mildly alkaline; abrupt smooth boundary.

B21t—3 to 7 inches; reddish brown (5YR 5/4) clay, reddish brown (5YR 4/4) moist; weak medium subangular blocky structure; hard, firm, very sticky and very plastic; common roots; faintly reflective surface, 1 to 2 mm wide, on faces of peds and in some pores; few tubular insect burrows 2 mm in diameter; noncalcareous; mildly alkaline; clear smooth boundary.

B22t—7 to 14 inches; reddish brown (5YR 4/4) clay, dark reddish brown (5YR 3/4) moist; moderate medium prismatic structure that parts to weak

medium subangular blocky; very hard, very firm, very sticky and very plastic; few roots; reflective surfaces, 2 to 3 mm wide, on peds; few carbonate nodules less than 1 mm in diameter; calcareous; mildly alkaline; clear smooth boundary.

B23t—14 to 19 inches; reddish brown (5YR 5/5) clay, reddish brown (5YR 4/5) moist; moderate medium prismatic structure that parts to weak medium subangular blocky; very hard, very firm, very sticky and very plastic; few roots; reflective surfaces, 2 to 3 mm wide, on peds; few carbonate nodules less than 1 mm in diameter; weakly calcareous; mildly alkaline; clear smooth boundary.

B24tca—19 to 23 inches; reddish brown (5YR 5/4) clay, reddish brown (5YR 4/4) moist; some parts slightly redder and of higher chroma; moderate medium prismatic structure that parts to weak medium subangular blocky; very hard, very firm, very sticky and very plastic; few roots; reflective surfaces as in B23t horizon; few carbonate nodules less than 2 mm in diameter; calcareous; moderately alkaline; clear smooth boundary.

B3ca—23 to 28 inches; pinkish white (7.5YR 8/2), light reddish brown (5YR 6/4), and light brown (7.5YR 6/4), clay loam, pink (7.5YR 7/4) and reddish brown (5YR 4/4) moist; weak medium and fine subangular blocky structure; slightly hard and hard, firm, sticky and plastic; few roots; common carbonate nodules and cylindroids; calcareous; moderately alkaline; clear wavy boundary.

C1ca—28 to 37 inches; pink (7.5YR 8/4) and light brown (7.5YR 6/4) clay loam, light brown (7.5YR 6/4) and brown (7.5YR 5/4) moist; weak medium subangular blocky structure; hard and slightly hard, firm, sticky and plastic; few roots; many carbonate nodules and cylindroids; calcareous; moderately alkaline; clear wavy boundary.

C2ca—37 to 49 inches; light brown (7.5YR 6/4) sandy clay loam, brown (7.5YR 5/4) moist; massive; hard and very hard, firm, sticky and plastic; few roots; many carbonate nodules and cylindroids; few fine tubular pores; calcareous; moderately alkaline; abrupt wavy boundary.

C3ca—49 to 60 inches; pinkish white (7.5YR 8/2) sandy clay loam, pink (7.5YR 7/4) moist; massive; hard, firm, sticky and plastic; common fine tubular pores; many carbonate nodules and cylindroids, calcareous; moderately alkaline.

Depth to the calcic horizon ranges from 20 to 40 inches. The content of organic carbon in upper 15 inches averages 0.6 to 1.5 percent.

The A horizon is pinkish gray, light yellowish brown, reddish brown, reddish gray, dark reddish gray, yellowish red, brown, light brown, strong brown, pale brown, light brownish gray, or grayish brown.

The B2t horizon is reddish brown, red, light reddish brown, light red, yellowish red, or reddish yellow. It is clay, clay loam, or sandy clay. Clay content is 35 to 50 percent.

The C horizon is pink, light brown, pinkish white, pinkish gray, light reddish brown, pinkish gray, pale brown, very pale brown, light brownish gray, or light yellowish brown.

Tencee series

The Tencee series consists of shallow, well drained soils that formed in gravelly alluvium on fans or ridges. Slopes are 3 to 15 percent. The average annual precipitation is 8 inches, and the average annual air temperature is 62 degrees F.

The Tencee soils are similar to Upton, Cave, and Simona soils. The Upton soils are nonskeletal. Cave and Simona soils are noncarbonatic and nonskeletal.

Typical pedon of Tencee very gravelly sandy loam in an area of Tencee-Upton association, 0.1 mile north of U.S. Highway 70, on the west bank of a borrow pit, in the SE1/4 of sec. 19, T. 23 S., R. 1 E.

A11ca—0 to 1 inch; light brown (7.5YR 6/4) very gravelly sandy loam, dark brown (7.5YR 4/4) moist; with some parts pinkish gray (7.5YR 6/2); weak medium platy and weak fine crumb structure; soft, friable, nonsticky and nonplastic; common very fine pores; pebbles are mostly very hard and carbonate-cemented; strong effervescence; moderately alkaline; abrupt smooth boundary.

A12ca—1 inch to 7 inches; light brown (7.5YR 6/4) very gravelly sandy loam, dark brown (7.5YR 4/4) moist; weak fine crumb and weak medium subangular blocky structure; soft, friable, nonsticky and nonplastic; few very fine roots; common very fine pores; pebbles are very hard and extremely hard carbonate-cemented nodules and plates; carbonate-cemented fragments are stained very pale brown (10YR 7/2) and internally are dominantly white (10YR 9/3) with some parts pink (7.5YR 8/2); strong effervescence; moderately alkaline; abrupt wavy boundary.

C1cam—7 to 13 inches; white (10YR 9/3) carbonate-cemented material, very pale brown (10YR 7/3) moist; moderate very coarse prismatic with prisms several feet in diameter; prisms have smooth surfaces and are discontinuously broken into weak or moderate coarse and very coarse plates; extremely hard; few roots in small channels or between plates; carbonate laminae occur discontinuously in upper part of uppermost plates; plates separated in places by loamy material in thin (1 to 2 mm) layers; plates have scattered pockets and channels, 2 to 5 mm in diameter, filled or partially filled with loamy material; strong effervescence; moderately alkaline; abrupt smooth boundary.

C2cam—13 to 26 inches; white (10YR 9/3) carbonate-cemented material, very pale brown (10YR 7/3)

moist; moderate very coarse prismatic with prisms several feet in diameter; prisms have smooth surfaces and are discontinuously coated with carbonate laminae; extremely hard; few pockets and channels 2 to 5 cm in diameter are partially filled with loamy material and contain the only roots in the horizon; strong effervescence; moderately alkaline; clear wavy boundary.

C3ca—26 to 35 inches; about 90 percent white (10YR 9/2) carbonate-cemented nodules, very pale brown (10YR 7/3) moist; nodules are extremely hard but most are readily removed from horizon; nodules, 1 to 2 cm in diameter or in clusters 5 to 10 cm in diameter, occur singly; some nodules have smooth, reflective surfaces; internodular material is about the same color as the nodules but is a light sandy clay loam and is a loose mass of soft fine crumbs and single grained material; strong effervescence; moderately alkaline; clear wavy boundary.

C4ca—35 to 50 inches; about 70 percent white (10YR 9/3) carbonate-cemented nodules, very pale brown (10YR 7/3) moist; nodules are hard; some nodules have smooth, reflective surfaces; internodular fine earth is about the same color, is a light sandy clay loam, and is massive and soft; strong effervescence; moderately alkaline; clear wavy boundary.

C5ca—50 to 66 inches; very pale brown (10YR 7/3) sandy loam, brown (10YR 5/3) moist; massive; soft; many sand grains coated with carbonate; few carbonate nodules, white (10YR 9/3); strong effervescence; moderately alkaline; clear wavy boundary.

C6—66 to 76 inches; pale brown (10YR 6/3) loamy sand, dark brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; thin, discontinuous carbonate coatings on sand grains; strong effervescence; moderately alkaline.

Gravel content ranges from 35 to 70 percent; calcium carbonate content exceeds 40 percent in the control section.

The A horizon is light brown, brown, very pale brown, pinkish gray, reddish gray, reddish brown, light reddish brown, light gray, or light yellowish brown.

The Ccam horizon is white, very pale brown, pinkish white, pink, or pinkish gray. The petrocalcic horizon is continuously indurated except for scattered cracks and pockets.

The Cca horizon is variable.

Terino series

The Terino series consists of shallow, well drained soils that formed in very gravelly alluvium on fans and terraces. Slopes are 1 to 8 percent. The average annual precipitation is 8 inches, and the average annual air temperature is 62 degrees F.

The Terino soils are similar to Casito and Nolam soils. The Casito soils have microscopic carbonates in the upper part of the Bt horizon. The Nolam soils are deep and do not have a petrocalcic horizon.

Typical pedon of Terino very gravelly sandy loam, in an area of Terino-Casito association, 50 feet east of Soledad Canyon Road, in SE1/4NW1/4NE1/4 sec. 21, T. 23 S., R. 3 E.

A2—0 to 2 inches; brown (7.5YR 5/4) very gravelly sandy loam, dark brown (7.5YR 4/4) moist; weak medium platy and weak fine crumb structure; soft, very friable, nonsticky and nonplastic; few medium roots; pebbles partially stained yellowish red (5YR 4/6, 5/6); mildly alkaline; abrupt smooth boundary.

B21t—2 to 9 inches; reddish brown (5YR 5/4) very gravelly sandy loam, reddish brown (5YR 4/4) moist; weak fine crumb structure; soft, very friable, nonsticky and nonplastic; few fine and medium roots; pebbles and sand grains coated with silicate clay; mildly alkaline; clear smooth boundary.

B22tca—9 to 15 inches; yellowish red (5YR 5/6) very gravelly sandy clay loam, yellowish red (5YR 4/5) moist; weak fine and medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common fine and medium roots; pebbles discontinuously stained yellowish red (5YR 4/6); pebbles and sand grains coated with silicate clay; few carbonate filaments on pebbles and faces of peds, common fine tubular pores; some with roots and weak carbonate accumulations; few volumes in lower part are dark red (2.5YR 3/6); generally noncalcareous with scattered calcareous parts; moderately alkaline; abrupt smooth boundary.

C1cam—15 to 21 inches; pink (7.5YR 8/4) very gravelly, carbonate-cemented material with a pebble-studded, discontinuously laminar upper surface; very hard and extremely hard; no roots except in scattered pockets, 1 to 3 in diameter, of loose, uncemented, carbonate-rich material; material of 5YR hue in a few places in upper part; calcareous; moderately alkaline; clear wavy boundary.

C2ca—21 to 32 inches; pink (7.5YR 7/4) very gravelly, discontinuously carbonate-cemented material, light brown (7.5YR 6/4) moist; hard; generally massive but single grain in some places between pebbles; few fine roots; pebbles thickly coated with carbonate and some are cemented together in clusters; moderately alkaline; calcareous; clear wavy boundary.

C3ca—32 to 47 inches; light brown (7.5YR 6/4) very gravelly sandy loam, brown (7.5YR 5/4) moist; massive; soft and loose, nonsticky and nonplastic; few fine roots; pebbles thinly coated with carbonate; a few clusters of carbonate-cemented pebbles; calcareous; moderately alkaline.

The solum in thickness and depth to the cemented pan ranges from 8 to 20 inches. The content of coarse fragments is 35 to 70 percent throughout the profile.

The A horizon is light reddish brown, reddish brown, pinkish gray, reddish gray, dark reddish gray, brown, light

brown, or dark brown. The soil surface has a desert pavement of closely packed angular rhyolite pebbles.

The Bt horizon is red, light red, light reddish brown, reddish brown, yellowish red, or reddish yellow. It is very gravelly sandy loam or very gravelly sandy clay loam.

The Ccam horizon is pink, pinkish gray, pinkish white, very pale brown, white, pinkish white, or pinkish gray. It is continuously indurated except for scattered cracks, in which roots commonly extend, and a few other zones of less continuous induration.

The Cca horizon is variable, and carbon content decreases with depth below the Ccam horizon.

Torriorthents

Torriorthents are shallow to deep, well drained soils on hills and dry mountains. Slopes are 15 to 80 percent. The average annual precipitation is 10 inches, and the average annual air temperature is 60 degrees F.

The soil material is gravelly, cobbly, and stony, coarse to fine alluvium and colluvium.

Upton series

The Upton series consists of shallow, well drained soils that formed on piedmont slopes and ridges in gravelly alluvium that derived from limestone. Slopes are 3 to 15 percent. The average annual precipitation is 8 inches, and the average annual air temperature is 62 degrees F.

The Upton soils are similar to Cave, Simona, Harrisburg, Tencee, and Nickel soils. The Cave and Simona soils have mixed mineralogy. Harrisburg soils are moderately deep to indurated caliche and have mixed mineralogy. Tencee soils are more than 35 percent gravel, and Nickel soils do not have the strongly cemented to indurated Ccam horizon.

Typical pedon of Upton gravelly sandy loam, in an area of Tencee-Upton association, in the SE corner of the NE1/4NE1/4 of sec. 27, T. 19 S., R. 3 W.

A1—0 to 8 inches; pale brown (10YR 6/3) gravelly sandy loam, brown (10YR 5/3) moist; weak fine granular structure; slightly hard, very friable, nonsticky and nonplastic; few fine roots; 25 percent lime-coated gravel; moderately calcareous; moderately alkaline; abrupt wavy boundary.

B2ca—8 to 16 inches; very pale brown (10YR 8/3) gravelly sandy loam, very pale brown (10YR 7/3) moist; weak fine subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common fine roots; 15 percent lime-coated gravel; strongly calcareous; moderately alkaline; clear smooth boundary.

C1cam—16 to 22 inches; very pale brown (10YR 8/3) indurated caliche, very pale brown (10YR 7/3) moist; interbedded with gravel.

C2ca—22 to 60 inches; very pale brown (10YR 8/3) very gravelly loam, very pale brown (10YR 7/3) moist; massive; hard, very friable, nonsticky and nonplastic; 30 percent lime-coated gravel; strongly calcareous; moderately alkaline.

Indurated caliche is at a depth of 7 to 20 inches. The thickness of the Ccam ranges from 6 to 20 inches. Gravel content ranges from 15 to 35 percent.

The A horizon is pale brown, brown, or pinkish brown.

The B horizon is very pale brown, pale brown, or brown.

The Ccam ranges from strongly cemented to indurated. Below the Ccam horizon the soil material is variable.

Vinton series

The Vinton series consists of deep, well drained soils that formed in recent alluvium along the Rio Grande. Slopes are 0 to 1 percent. The average annual precipitation is 8 inches, and the average annual air temperature is 60 degrees F.

Vinton soils are similar to Anthony, Harkey, and Agua soils. Anthony soils are moderately coarse textured; Harkey soils are medium textured; and Agua soils are medium textured over coarse textured.

Typical pedon of Vinton loam, in an area of Anthony-Vinton loams, 25 feet from west edge of field and 800 feet south of Highway 359 on east side of Del Rio Drain, in the NE corner of the NW1/4SW1/4 of sec. 35, T. 23 S., R. 1 W.

Ap—0 to 16 inches; brown (7.5YR 5/2) loam, dark brown (7.5YR 4/2) moist; massive; very hard, friable, slightly sticky and nonplastic; many fine roots; many fine tubular pores; strongly calcareous; moderately alkaline; clear wavy boundary.

C1—16 to 30 inches; light brown (7.5YR 6/4) loamy fine sand; brown (7.5YR 5/4) moist; massive; slightly hard, very friable; few fine roots; many fine interstitial pores; strongly calcareous; moderately alkaline; clear smooth boundary.

C2—30 to 60 inches; light brown (7.5YR 6/4) loamy fine sand; brown (7.5YR 5/4) moist; massive; slightly hard, very friable; few fine roots; many fine interstitial pores; strongly calcareous; moderately alkaline.

The A horizon is loam, clay loam, or fine sandy loam.

The C horizon is light brown, brown, or pale brown loamy fine sand or loamy sand. There are strata of fine sand, very fine sand, and finer textured material.

Vinton Variant

The Vinton Variant consists of deep, well drained soils that formed in mixed alluvium along the flood plain of the Rio Grande at an elevation of 3,200 to 4,120 feet. Slopes are 0 to 1 percent. The average annual precipitation is 8 inches, and the average annual air temperature is 60 degrees F.

Vinton Variant soils are similar to Vinton, Anthony, Harkey, and Agua soils. The Vinton soils are coarse

textured; Anthony soils, moderately coarse textured; Harkey soils, medium textured; and Agua soils, medium textured over coarse textured.

Typical pedon of Vinton Variant fine sandy loam, 15 feet east and 15 feet north of the first yellow gasline warning post west of the bridge over Seldon drain, in the SW corner of the NE1/4NW1/4 of sec. 6, T. 22 S., R. 1 E.

Ap—0 to 14 inches; brown (10YR 5/3) fine sandy loam, brown (10YR 4/3) moist; massive; soft, very friable, slightly sticky and slightly plastic; common very fine roots; many fine interstitial and few fine tubular pores; moderately calcareous; moderately alkaline; abrupt wavy boundary.

C1—14 to 32 inches; pale brown (10YR 6/3) loamy fine sand, yellowish brown (10YR 5/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine roots; many fine tubular pores; moderately calcareous; moderately alkaline; abrupt wavy boundary.

IIC2—32 to 42 inches; light brownish gray (10YR 6/2) silty clay loam, brown (10YR 4/3) moist; massive; hard, friable, sticky and plastic; no roots; many very fine tubular pores; moderately calcareous; moderately alkaline; abrupt smooth boundary.

IIIC3—42 to 60 inches; pale brown (10YR 6/3) sand, brown (10YR 5/3) moist; single grained; loose, nonsticky and nonplastic; no roots; many very fine interstitial pores; moderately alkaline.

The A horizon is brown or pale brown sandy clay loam or fine sandy loam.

The C1 horizon is pale brown or light brown loamy fine sand, fine sand, or loamy sand.

The IIC2 horizon is light brownish gray, light brown, or brown clay, silty clay, silty clay loam, or clay loam.

Wink series

The Wink series consists of deep, well drained soils that formed in old unconsolidated alluvium that has been modified by wind. The soils are on broad piedmont fans. Slopes are 0 to 1 percent. The average annual precipitation is 8 inches, and the average annual air temperature is 62 degrees F.

The Wink soils are similar to Dona Ana, Onite, and Pajarito soils. Dona Ana soils are medium textured and have a B2t horizon. Onite and Pajarito soils are moderately coarse textured and do not have a calcic horizon. Onite soils have a B2t horizon.

Typical pedon of Wink loamy fine sand in an area of Wink-Pintura complex, 350 feet west of road, 1,520 feet south along road from railroad crossing, in the NW corner of the SW1/4SE1/4 of sec. 24, T. 28 S., R. 2 E.

A1—0 to 10 inches; light brown (7.5YR 6/4) loamy fine sand, brown (7.5YR 5/4) moist; single grained; loose when dry and moist, nonsticky and nonplastic; common very fine roots; common very fine interstitial pores; moderately calcareous; moderately alkaline; clear smooth boundary.

B2—10 to 20 inches; pink (7.5YR 7/4) fine sandy loam, light brown (7.5YR 6/4) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and medium roots; common very fine interstitial pores; strongly calcareous; moderately alkaline; clear smooth boundary.

C1ca—20 to 24 inches; pink (7.5YR 7/4) sandy loam, light brown (7.5YR 6/4); massive; very hard, friable, slightly sticky and slightly plastic; common very fine and medium roots; common very fine interstitial pores; lime segregated in large masses, pink (7.5YR 8/4) and pink (7.5YR 7/4) moist; lime segregated in rounded fine, soft splotches; strongly calcareous; moderately alkaline; clear wavy boundary.

C2ca—24 to 40 inches; pink (7.5YR 8/4) sandy loam, pink (7.5YR 7/4) moist; massive; very hard, very firm, nonsticky and nonplastic; few medium roots; common very fine interstitial and few tubular pores; horizon is impregnated with lime that is weakly cemented; moderately alkaline; clear wavy boundary.

C3ca—40 to 60 inches; pink (7.5YR 7/4) loamy fine sand, brown (7.5YR 5/4) moist; massive; hard, very friable, nonsticky and nonplastic; few medium roots; common very fine interstitial pores and few fine tubular pores; horizon is impregnated with lime, which decreases below a depth of 45 inches; strongly calcareous; strongly alkaline.

The A horizon is light brown or brown. It is loamy fine sand, loamy sand, or fine sandy loam.

The B2 horizon is pink, light brown, pale brown, or brown. There are few to many thin threads and splotches of segregated lime.

The Cca horizon is pink, light brown, or brown. The lime content ranges from many soft masses to a horizon that is highly impregnated with lime. The calcium carbonate equivalent ranges from 25 to 45 percent. In some pedons, unconformable material occurs below a depth of 40 inches.

Yturbide series

The Yturbide series consists of deep, excessively drained soils that formed in alluvium along side and terminal fans of arroyos and old river deposits. Slopes are 1 to 5 percent. The average annual precipitation is 8 inches, and the average annual air temperature is 60 degrees F.

The Yturbide soils are similar to Arizo, Bluepoint, Caliza, and Canutio soils. The Arizo soils are sandy-skeletal, Bluepoint soils are sandy and less than 15 percent gravel, Caliza soils are high in calcium carbonate and are sandy-skeletal, and Canutio soils are loamy-skeletal.

Typical pedon of Yturbide loamy sand in an area of Bluepoint-Caliza-Yturbide association, 460 feet south of underpass on Interstate 25, about 1 mile north of Lohman turnoff and 160 feet east of I-25, in the NW1/4SE1/4NE1/4 of sec. 16, T. 23 S., R. 2 E.

A1—0 to 15 inches; pinkish gray (7.5YR 6/2) loamy sand; brown (7.5YR 4/2) moist; weak thick platy structure; soft, very friable; 12 percent mixed igneous gravel; common fine and very fine roots; many fine interstitial pores; moderately calcareous; lime disseminated and patchy coatings on gravel; moderately alkaline; clear smooth boundary.

C1—15 to 26 inches; light brown (7.5YR 6/4) gravelly loamy sand, brown (7.5YR 5/4) moist; massive; soft, very friable; 25 percent mixed igneous gravel; common fine and very fine roots; many fine interstitial pores; moderately calcareous; lime disseminated and patchy coatings on gravel; moderately alkaline; clear smooth boundary.

C2—26 to 60 inches; light brown (7.5YR 6/4) gravelly sand, brown (7.5YR 5/4) moist; massive; soft, very friable; 20 percent mixed igneous gravel; few fine and very fine roots to a depth of 36 inches; many fine interstitial pores; moderately calcareous, lime disseminated and patchy coatings on gravel; moderately alkaline.

Gravel content ranges from 15 to 35 percent.
The A horizon is pink or pinkish gray.
The C horizon is very pale brown or light brown.

Formation of the soils

Soil formation is largely controlled by five major factors: (1) the physical and mineralogical nature of the parent material, (2) plant and animal life, (3) topography, (4) present and past climatic conditions, and (5) time.

The active factors, climate and organisms, alter the parent material over a length of time, resulting in more or less distinct soil layers or horizons. No single factor dominates the soil-forming process except in extreme cases. Rather, the effect of any one factor is either enhanced or hindered by the others. For example, topography can modify the effect of rainfall by influencing drainage and surface runoff. Likewise, rainfall and temperature together can stimulate the effect of vegetation in soil formation. These and other interactions give rise to the different soil characteristics found within any given landscape.

The Soil Conservation Service has made extensive studies of landscape evolution and soil development within a 400 square-mile area in the Dona Ana County Area (fig. 7). These studies, collectively termed the Desert Soil-Geomorphology Project, provide more detailed information to augment the general discussion that follows (*13, 16, 21*).

Parent material

Several types of parent material occur within the survey area including: (1) recent alluvium, (2) old unconsolidated alluvium, (3) alluvium modified by wind, (4) alluvial fan and piedmont sediments, and (5) material weathered from basalt, granite, monzonite,, andesite, and other intermediate volcanics and from rhyolite, limestone, sandstone, and shale (*5, 6, 8, 10, 21*).

Recent alluvium occurs along the Rio Grande and its tributaries. Before the construction of Elephant Butte Dam and various levees, the river water periodically overspread its banks and lost the power to transport sediment. Sand-sized particles, followed by silt-sized particles, settled out. In areas where the water was trapped, clay particles settled. The Rio Grande changed its course many times, resulting in a complex pattern of soils. Brazito and Vinton soils formed in sandy alluvium, and Agua, Anapra, and Glendale soils formed in loamy and silty deposits. Armijo and Belen soils formed in clayey alluvium in oxbow lakes or other areas of slack water. Since 1940, major flooding has been controlled by levees and dams, but some flooding along tributary arroyos has occurred since that time. Dams have been or are being constructed in these areas. Irrigated cropland receives a small amount of sediment annually from silty irrigation water diverted from the Rio Grande.

Old unconsolidated alluvial deposits came from the ancestral Rio Grande and its tributaries (*7*). Soils such as Wink and Bluepoint formed in the sandy part of such deposits. In many places, this parent material is modified by wind.

Piedmont sediments, composed primarily of fan alluvium, occur along mountain fronts; Berino, Dona Ana, and Bucklebar soils formed in these mixed alluvial deposits.

Several volcanic cones and basalt flows are in the western part of the survey area. Akela and Aftaden soils formed, in part, from basalt.

Most soils in the area have mixed clay minerals including montmorillonite, vermiculite, illite, kaolinite, and chlorite. For example, Armijo soils formed in clayey alluvium that is dominantly montmorillonitic clay. All of these soils have received varying amounts of atmospheric contributions, mainly in the form of calcareous dust (*15*).

Plant and animal life

Plants and animals play an active role in soil formation (*19*). Plant roots grow downward and outward into the parent material, displacing the various soil particles, increasing porosity, and distributing organic material which, in turn, encourages the formation of structural units or aggregates. Roots also act to recycle nutrient elements from the lower to the upper soil layers. Burrowing animals, including rodents, earthworms, and a variety of insects, mix soil particles and contribute to the accumulation of organic matter. Bacteria and fungi living on and

in the soil feed on the organic debris, breaking it into constituent nutrient elements that are eventually recycled into plant and animal tissue. Man also affects soil formation through such practices as land leveling, tilling, irrigating, and planting crops.

Bluepoint and Arizo soils formed under sparse stands of grass; as a result, they have a light colored surface layer that is relatively low in content of organic matter. Nolam soils formed under moderate stands of grass and thus have a darker colored surface layer that has a somewhat higher organic matter content. Motoqua soils formed under a more dense vegetative cover and have a dark colored surface layer that is more than 1 percent organic matter. In the irrigated Rio Grande Valley, man has exerted a major influence on the Agua, Anapra, Anthony, Armijo, Belen, Brazito, Glendale, Harkey, and Vinton soils.

Vegetation is sparse in much of the area because of the semiarid climate. In some areas, the soil has been reworked by wind into dunes. Pintura soils are located on these sites. Berino, Dona Ana, and Wink soils have a light colored surface horizon that is less than 0.5 percent organic matter. Motoqua soils in the Sierra de las Uvas Mountains have a more dense stand of grass and thus developed a darker colored surface horizon that is more than 1 percent organic matter.

Topography

Topographic variations are differences not only in elevation but also in the general shape of the landscape. As such, topography influences soil formation indirectly by affecting surface runoff, drainage, erosion, and exposure to sun and wind. The north slopes are less exposed to sunlight and wind; thus, there is more moisture, which produces more vegetation. These factors, in turn, influence the buildup of organic matter in the soil. Soils in drainageways and on basin floors generally support more vegetation and have a higher organic matter content than higher lying soils. The soils that formed on the nearly level valley bottoms are young. Repeated deposition of sediment has hindered development. Soils that formed in gently sloping to steep areas on uplands are generally older. Soils generally do not form in very steep mountain areas because the rate of erosion is nearly the same as that of soil formation.

Climate

Climate is perhaps the most important factor influencing soil formation. It not only controls many of the physical and chemical reactions that occur but also has an effect on time and topography.

The climate in the survey area has alternated from moist to dry since the mid-Pleistocene period. Although records are incomplete (*13, 21*), it is apparent that precipitation and temperature largely determine the kind and amount of vegetation that grows. An abundance of moisture tends to increase the plant cover and the content of organic carbon. For example, soils that formed in low-carbonate parent material have little organic matter (Typic Haplargids) if they formed on fans and piedmonts where there is little available moisture, or they have slightly more organic matter (Ustollic Haplargids) if they formed on basin floors and toe slopes where there is slightly more available moisture (*9*).

The survey area has a semiarid continental climate. The average annual precipitation is 8 inches. In areas of the Organ and Uvas Mountains and their adjacent foothills, the average annual precipitation is 16 inches. The average annual air temperature ranges from 51 degrees in the Organ Mountains to 60 degrees in the Rio Grande Valley.

Precipitation moving through the soil causes eluviation of clay colloids from the surface layer to the underlying layers. This accumulation of clay in the solum forms an argillic horizon. Precipitation, along with warm temperatures, also causes rapid decomposition of organic matter.

Time

Time is required for the formation of a soil from a parent material. The length of time required for soil formation is dependent on the other soil-forming factors. The soils in the Dona Ana survey area range from young soils that have little or no horizon development to older soils that have distinct horizons. Radiocarbon ages have been determined for several buried charcoal layers in the survey area (*12*). The sequence of geomorphic surfaces provides evidence of the effect of time, and relative ages of soils can be established accordingly (*11*).

Harkey and Glendale soils formed on the Rio Grande flood plain. They retain most of the characteristics of their parent material, although the surface layer is slightly darkened and some weak structure replaces the original thin, platy stratification.

By comparison, Berino soils are older and more developed, as evidenced by the movement of calcium carbonate (lime). With time, calcium carbonate from within the soil and from wind-deposited, calcareous dust is leached out of the upper soil layers and then deposited at a lower depth. The resulting zone of lime accumulation appears between a depth of 20 to 50 inches in Berino soils. Still older soils, such as Simona soils, developed a very hard or indurated layer of calcium carbonate. In these soils, the calcium moved through the upper layers of an old buried soil to the depth of the water movement. The lower horizons were plugged with calcium carbonates and, over time, became hard.

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Glossary

ABC soil. A soil having an A, a B, and a C horizon.

AC soil. A soil having only an A and a C horizon. Commonly such soil formed in recent alluvium or on steep rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali (sodic) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher), or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch

of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3.5
Low	3.5 to 5.0
Moderate	5.0 to 7.5
High	7.5 to 10.0
Very high	More than 10

Badland. Steep or very steep, commonly nonstony barren land dissected by many intermittent drainage channels. Badland is most common in semiarid and arid regions where streams are entrenched in soft geologic material. Local relief generally ranges from 25 to 500 feet. Runoff potential is very high, and geologic erosion is active.

Base saturation. The degree to which material having base exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bench terrace. A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Blowout. A shallow depression from which all or most of the soil material has been removed by wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of pebbles or cobbles. In some blowouts the water table is exposed.

Bottom land. The normal flood plain of a stream, subject to frequent flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Broad-base terrace. A ridge-type terrace built to control erosion by diverting runoff along the contour at a nonscouring velocity. The terrace is 10 to 20 inches high and 15 to 30 feet wide and has gently sloping sides, a rounded crown, and a dish-shaped channel along the upper side. It may be nearly level or have a grade toward one or both ends.

Calcareous soil. A soil containing enough calcium carbonate (commonly with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid. A soil having measurable amounts of calcium carbonate or magnesium carbonate.

Caliche. A more or less cemented deposit of calcium carbonate in soils of warm-temperate, subhumid to arid areas. Caliche occurs as soft, thin layers in the soil or as hard, thick beds just beneath the solum, or it is exposed at the surface by erosion.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Catena. A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity, but is more precise in meaning.

Catsteps. Very small, irregular terraces on steep hillsides, especially in pasture, formed by the trampling of cattle or the slippage of saturated soil.

Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a fragment.

Chiseling. Tillage with an implement having one or more soil-penetrating points that loosen the subsoil and bring clods to the surface. A form of emergency tillage to control soil blowing.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coat, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Climax vegetation. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse textured (light textured) soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the bases of steep slopes.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures is difficult.

Complex, soil. A map unit of two or more kinds of soil occurring in such an intricate pattern that they cannot be shown separately on a soil map at the selected scale of mapping and publication.

Compressible. Excessive decrease in volume of soft soil under load.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping (or contour farming). Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is 40 or 80 inches (1 or 2 meters).

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave. Unstable walls of cuts made by earth-moving equipment. The soil sloughs easily.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deferred grazing. A delay in grazing until range plants have reached a specified stage of growth. Grazing is deferred in order to increase the vigor of forage and to allow desirable plants to produce seed. Contrasts with continuous grazing and rotation grazing.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly con-

tinuous, they can have moderate or high slope gradients, as for example in "hillpeats" and "climatic moors."

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by running water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes a bare surface.

Excess fines. Excess silt and clay. The soil does not provide a source of gravel or sand for construction purposes.

Excess lime. Excess carbonates. Excessive carbonates, or lime, restrict the growth of some plants.

Excess salts. Excess water soluble salts. Excessive salts restrict the growth of most plants.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grains are grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fast intake. The rapid movement of water into the soil.

Favorable. Favorable soil features for the specified use.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured (heavy textured) soil. Sandy clay, silty clay, and clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist, 6 to 15 inches (15 to 37.5 centimeters) long.

Flooding. The temporary covering of soil with water from overflowing streams, runoff from adjacent slopes, and tides. Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *occasional* that it occurs on an average of once or less in 2 years; and *frequent* that it occurs on an average of more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; *November-May*, for example, means that flooding can occur during the period November through May. Water standing for short periods after rainfall or commonly covering swamps and marshes is not considered flooding.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Forage. Plant material used as feed by domestic animals. Forage can be grazed or cut for hay.

Forb. Any herbaceous plant not a grass or a sedge.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gilgai. Typically, the microrelief of Vertisols—clayey soils having a high coefficient of expansion and contraction with changes in moisture content. Commonly a succession of microbasins and microknolls in nearly level areas or of microvalleys and microridges parallel with the slope.

Glacial drift (geology). Pulverized and other rock material transported by glacial ice and then deposited. Also the assorted and unassorted material deposited by streams flowing from glaciers.

Glacial outwash (geology). Gravel, sand, and silt, commonly stratified, deposited by melt water as it flows from glacial ice.

Glacial till (geology). Unassorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material from 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.5 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table, which is the upper limit of saturation.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Gypsum. Hydrous calcium sulphate.

Habitat. The natural abode of a plant or animal; refers to the kind of environment in which a plant or animal normally lives, as opposed to the range or geographical distribution.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. The major horizons of mineral soil are as follows:

O horizon.—An organic layer, fresh and decaying plant residue, at the surface of a mineral soil.

A horizon.—The mineral horizon, formed or forming at or near the surface, in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon most of which was originally part of a B horizon.

A2 horizon.—A mineral horizon, mainly a residual concentration of sand and silt high in content of resistant minerals as a result of the loss of silicate clay, iron, aluminum, or a combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or a combination of these; (2) by prismatic or blocky structure; (3) by redder or browner colors than those in the A horizon; or (4) by a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that from which the solum is presumed to have formed. If the material is known to differ from that in the solum the Roman numeral II precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Hummocky. Refers to a landscape of hillocks, separated by low sags, having sharply rounded tops and steep sides. Hummocky relief resembles rolling or undulating relief, but the tops of ridges are narrower and the sides are shorter and less even.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, invader plants are those that follow disturbance of the surface.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.
Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.
Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Landslide. The rapid downhill movement of a mass of soil and loose rock generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones. Rock fragments 10 inches (25 centimeters) or more across. Large stones adversely affect the specified use.

Leaching. The removal of soluble material from soil or other material by percolating water.

Light textured soil. Sand and loamy sand.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is greater than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous areas. Areas that have little or no natural soil, are too nearly inaccessible for orderly examination, or cannot otherwise be feasibly classified.

Moderately coarse textured (moderately light textured) soil. Sandy loam and fine sandy loam.

Moderately fine textured (moderately heavy textured) soil. Clay loam, sandy clay loam, and silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of the three single variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Narrow-base terrace. A terrace no more than 4 to 8 feet wide at the base. A narrow-base terrace is similar to a broad-base terrace, except for the width of the ridge and channel.

Nutrient, plant. Any element taken in by a plant, essential to its growth, and used by it in the production of food and tissue. Plant nutrients are nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, zinc, and perhaps other elements obtained from the soil; and carbon, hydrogen, and oxygen obtained largely from the air and water.

Pan. A compact, dense layer in a soil. A pan impedes the movement of water and the growth of roots. The word "pan" is commonly combined with other words that more explicitly indicate the nature of the layer; for example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan.*

Parent material. The great variety of unconsolidated organic and mineral material in which soil forms. Consolidated bedrock is not yet parent material by this concept.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a bloc.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Permeability. The quality that enables the soil to transmit water or air, measured as the number of inches per hour that water moves through the soil. Terms describing permeability are *very slow* (less than 0.06 inch), *slow* (0.06 to 0.20 inch), *moderately slow* (0.2 to 0.6 inch), *moderate* (0.6 to 2.0 inches), *moderately rapid* (2.0 to 6.0 inches), *rapid* (6.0 to 20 inches), and *very rapid* (more than 20 inches).

Phase, soil. A subdivision of a soil series or other unit in the soil classification system based on differences in the soil that affect its management. A soil series, for example, may be divided into phases on the bases of differences in slope, stoniness, thickness, or some other characteristic that affects management. These differences are too small to justify separate series.

pH value. (See Reaction, soil). A numerical designation of acidity and alkalinity in soil.

Piping. Moving water of subsurface tunnels or pipelike cavities in the soil.

Pitting. Formation of pits as a result of the melting of ground ice after the removal of plant cover.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from a semisolid to a plastic state.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Polypedon. A volume of soil having properties within the limits of a soil series, the lowest and most homogeneous category of soil taxonomy. A "soil individual."

Poorly graded. Refers to soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor outlets. Surface or subsurface drainage outlets difficult or expensive to install.

Productivity (soil). The capability of a soil for producing a specified plant or sequence of plants under a specified system of management. Productivity is measured in terms of output, or harvest, in relation to input.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Range (or rangeland). Land that, for the most part, produces native plants suitable for grazing by livestock; includes land supporting some forest trees.

Range condition. The health or productivity of forage plants on a given range, in terms of the potential productivity under normal climate and the best practical management. Condition classes generally recognized are—*excellent, good, fair,* and *poor*. The classification is based on the percentage of original, or assumed climax vegetation on a site, as compared to what has been observed to grow on it when well managed.

Range site. An area of range where climate, soil, and relief are sufficiently uniform to produce a distinct kind and amount of native vegetation.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	Below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock. Soil scientists regard as soil only the part of the regolith that is modified by organisms and other soil-building forces. Most engineers describe the whole regolith, even to a great depth, as "soil."

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulates over disintegrating rock.

Rill. A steep sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth. Shallow root zone. The soil is shallow over a layer that greatly restricts roots. See Root zone.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged in stream channels from a drainage area. The water that flows off the land surface without sinking in is called surface runoff; that which enters the ground before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline-alkali soil. A soil that contains a harmful concentration of salts and exchangeable sodium; contains harmful salts and is strongly alkaline; or contains harmful salts and exchangeable sodium and is very strongly alkaline. The salts, exchangeable sodium, and alkaline reaction are in the soil in such location that growth of most crop plants is less than normal.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-size particles.

Saprolite (geology). Soft, earthy, clay-rich, thoroughly decomposed rock formed in place by chemical weathering of igneous and metamorphic rock. In soil survey, the term saprolite is applied to any unconsolidated residual material underlying the soil and grading to hard bedrock below.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate

types. Some wind-deposited sand is consolidated into sandstone.

Seepage. The rapid movement of water through the soil. Seepage adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon.

Series, soil. A group of soils, formed from a particular type of parent material, having horizons that, except for the texture of the A or surface horizon, are similar in all profile characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineralogical and chemical composition.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and runoff water.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silica-alumina ratio. The molecular ratio of silica to alumina in soil, clay, or any alumino-silicate mineral.

Silica-sesquioxide ratio. The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Sinkhole. A depression in a landscape where limestone has been locally dissolved.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slick spot. Locally, a small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil is generally silty or clayey, is slippery when wet, and is low in productivity.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Sloughed till. Water-saturated till that has flowed slowly downhill from its original place of deposit by glacial ice. It may rest on other till, on glacial outwash, or on a glaciolacustrine deposit.

Slow intake. The slow movement of water into the soil.

Slow refill. The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones. Rock fragments 3 to 10 inches (7.5 to 25 centimeters) in diameter. Small stones adversely affect the specified use.

Sodicity. The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na^{++} to $Ca^{++} + Mg^{++}$. The degrees of sodicity are—

	SAR
Slight	Less than 13:1
Moderate	13-30:1
Strong	More than 30:1

Soil. A natural, three-dimensional body at the earth's surface that is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows: *very coarse sand* (2.0 millimeters to 1.0 millimeter); *coarse sand* (1.0 to 0.5 millimeter); *medium sand* (0.5 to 0.25 millimeter); *fine sand* (0.25 to 0.10 millimeter); *very fine sand* (0.10 to 0.05 millimeter); *silt* (0.005 to 0.002 millimeter); and *clay* (less than 0.002 millimeter).

Solodized soil. A formerly alkali (sodic) soil that has been leached so that it has become acid and has a thick, gray upper layer over an acid, blocky B horizon. The resulting soil may be termed a Soloth.

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in mature soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristics of the soil are largely confined to the solum.

Stone line. A concentration of coarse fragments in soils that generally marks an old weathering surface. In a cross section, the line may be one fragment or more thick. The line generally overlies material that weathered in place and marks the top of a paleosol. It is ordinarily overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stratified. Arranged in strata, or layers. The term refers to geologic material. Layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates that are separated from adjoining aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular. Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil, or partly worked into the soil, to provide protection from soil blowing and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use or management.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that it can soak into the soil or flow slowly to a prepared outlet without harm. A terrace in a field is generally built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea. A stream terrace is frequently called a second bottom, in contrast with a flood plain, and is seldom subject to overflow. A marine terrace, generally wide, was deposited by the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt, silt loam, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or " very fine."

Tilth, soil. The condition of the soil, especially the soil structure, as related to the growth of plants. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil (engineering). Presumably a fertile soil or soil material, or one that responds to fertilization, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Trace elements. The chemical elements in soils, in only extremely small amounts, essential to plant growth. Examples are zinc, cobalt, manganese, copper, and iron.

Tuff. A compacted deposit 50 percent or more volcanic ash and dust.

Unstable fill. Risk of caving or sloughing in banks of fill material.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial melt water. In nonglaciated regions, alluvium deposited by heavily loaded streams emerging from hills or mountains and spreading sediments onto the lowland as a series of adjacent alluvial fans.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but the limited geographic soil area does not justify creation of a new series.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Varve. A sedimentary layer or a lamina or sequence of laminae deposited in a body of still water within 1 year; specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.

Water table. The upper limit of the soil or underlying rock material that is wholly saturated with water.

Water table, apparent. A thick zone of free water in the soil. An apparent water table is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

Water table, artesian. A water table under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole.

Water table, perched. A water table standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to a soil or soil material consisting of particles well distributed over a wide range in size or diameter. Such a soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

ILLUSTRATIONS

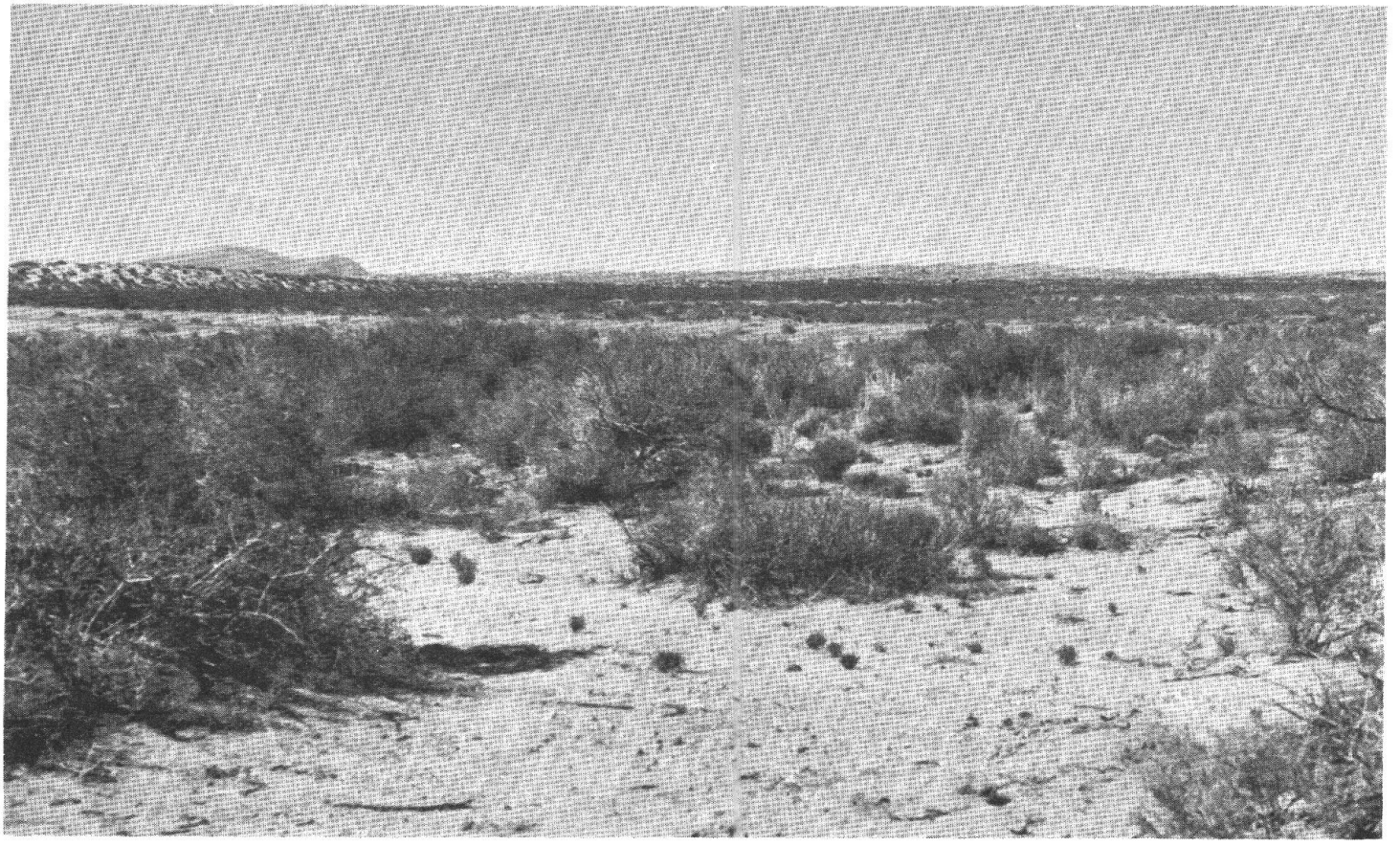


Figure 1.—An area of Bluepoint loamy sand, 1 to 5 percent slopes.

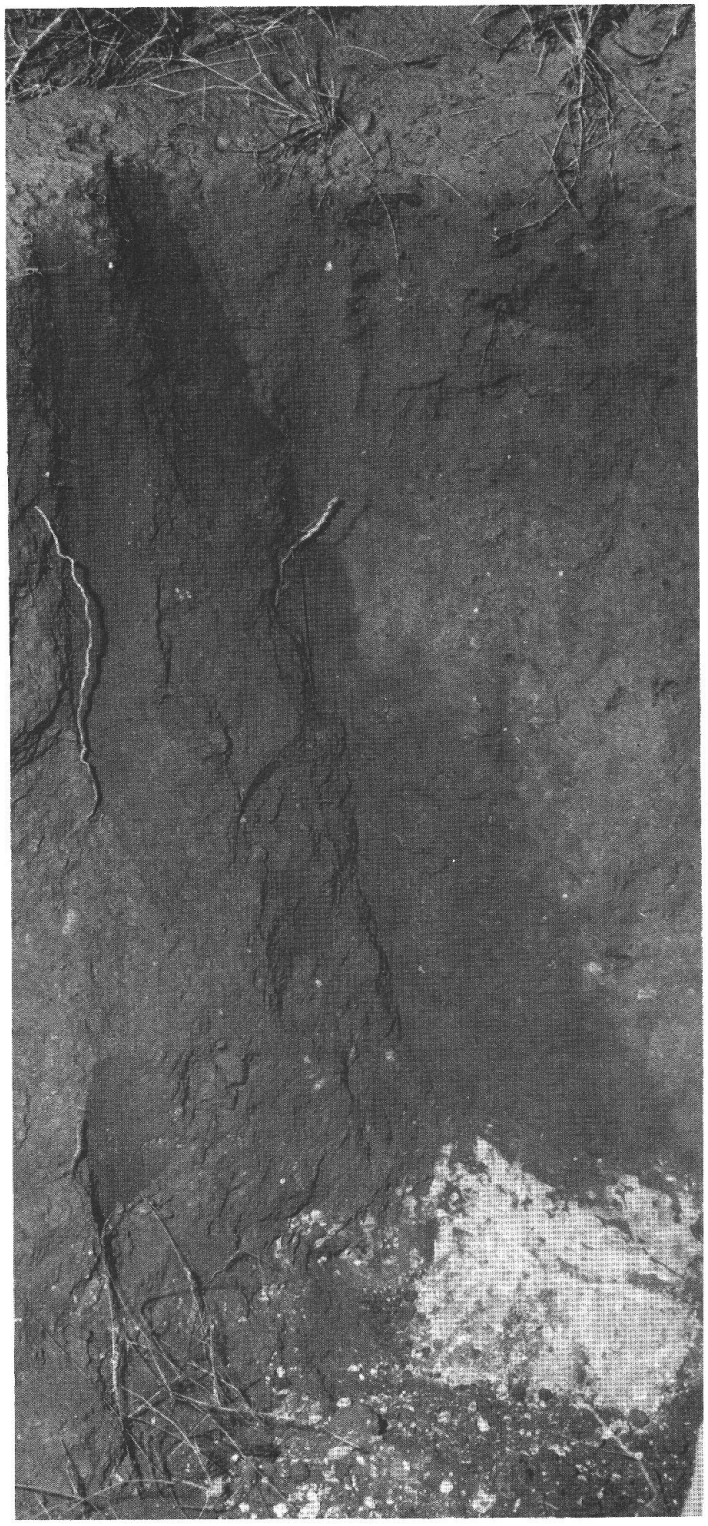


Figure 2.—Indurated, white caliche underlies Cacique loamy sand.

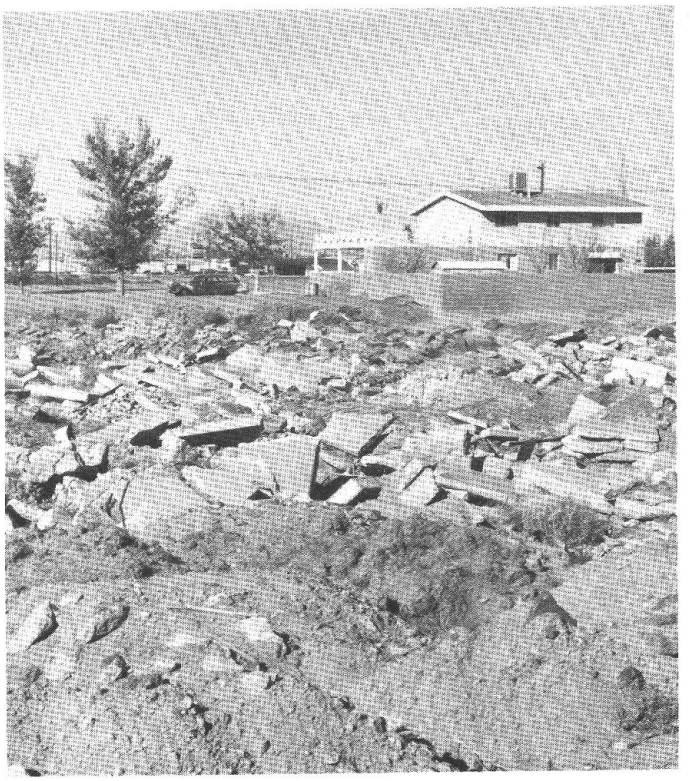
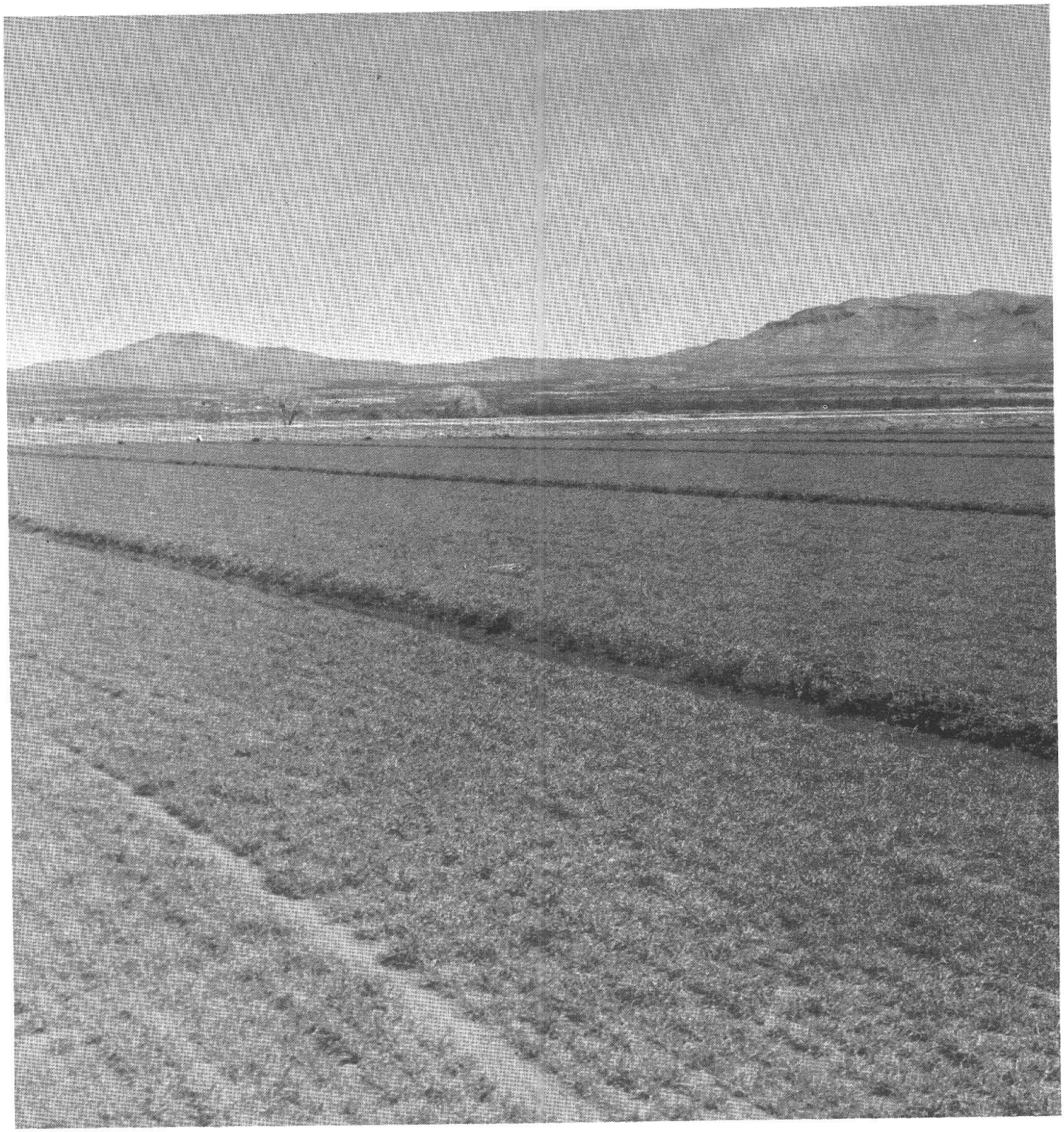


Figure 3.—Dumps are unstable areas of construction debris and other solid waste material.

Most of the irrigated land in the survey area is in the Rio Grande Valley. Vegetables, pecans, and small grains are primary crops. The field of tomatoes (Figure 4, above) is on Harkey loam. The pecan orchard (Figure 5, left) is on Glendale loam, and the field of barley (Figure 6, right) is Glendale clay loam.



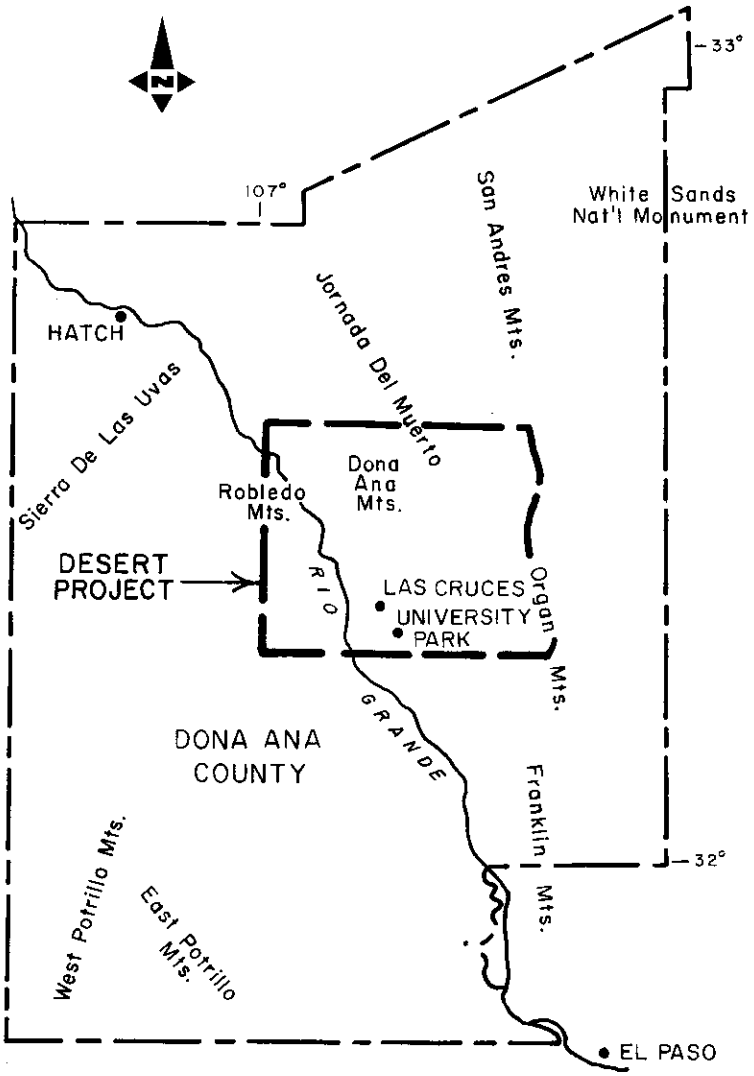


Figure 7.—Location of the Desert Soil Geomorphology Project.

TABLES

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Recorded in the period 1936-65 at New Mexico State University]

Month	Temperature				Precipitation				
			Two years in 10 will have at least 4 days with--			One year in 10 will have--		Average number of days with precipitation	
	Average daily maximum	Average daily minimum	Maximum temperature equal to or higher than--	Minimum temperature equal to or lower than--	Average total	more than--	less than--	0.10 inch or more	0.25 inch or more
	°F	°F	°F	°F	Inches	Inches	Inches		
January	57	26	69	12	0.5	(1/)	1.1	1	1
February	63	28	75	16	0.5	(1/)	1.4	1	1
March	68	34	79	23	0.3	(1/)	0.7	1	(2/)
April	78	41	86	31	0.1	(1/)	0.6	2/	(2/)
May	86	50	95	39	0.3	(1/)	0.7	1	(2/)
June	94	59	102	47	0.5	(1/)	1.1	1	1
July	94	65	101	60	1.3	0.3	2.9	4	2
August	92	64	95	50	1.4	0.3	2.8	3	2
September	87	56	95	44	1.3	(1/)	2.5	3	2
October	74	44	87	33	0.7	(1/)	1.6	2	1
November	64	31	77	19	0.3	(1/)	1.0	1	(2/)
December	57	27	69	15	0.5	(1/)	1.1	2	1
Year	76	44	103 3/	8 4/	7.7	0.8	10.1	20	11

[1] Less than 0.05 inch.
[2] Less than half a day.
[3] Average annual highest maximum.
[4] Average annual lowest minimum.

TABLE 2.--FREEZE DATES IN SPRING AND FALL

Probability	Dates for given probability at temperature of--						
	16° F or lower*	20° F or lower*	24° F or lower*	28° F or lower*	32° F or lower*	36° F or lower**	40° F or lower**
Spring:							
1 year in 10 later than	Mar. 9	Mar. 24	Apr. 4	Apr. 18	May 1	May 15	May 24
2 years in 10 later than	Mar. 1	Mar. 16	Mar. 31	Apr. 13	Apr. 26	May 10	May 20
5 years in 10 later than	Feb. 9	Feb. 27	Mar. 20	Apr. 2	Apr. 15	Apr. 27	May 9
Fall:							
1 year in 10 earlier than	Nov. 11	Nov. 6	Nov. 5	Oct. 29	Oct. 19	Oct. 7	Sept. 29
2 years in 10 earlier than	Nov. 19	Nov. 11	Nov. 9	Nov. 1	Oct. 24	Oct. 11	Oct. 2
5 years in 10 earlier than	Dec. 5	Nov. 23	Nov. 14	Nov. 5	Oct. 29	Oct. 18	Oct. 10

*Recorded in the period 1926-55 at New Mexico State University.
**Recorded in the period 1931-60 at New Mexico State University.

TABLE 3.--MISCELLANEOUS WEATHER ELEMENTS

[Data recorded at New Mexico State University]

Month	Average evaporation[1]		Average relative humidity[2]		Wind[3]		Average percent of possible sunshine[4]	Average snowfall[5]
	Class A pan	Percent of annual	7:30 a.m.	5:30 p.m.	Average speed	Prevailing direction		
	In				Mi/h			In
January	2.95	3	72	39	5.3	N	73	0.5
February	4.38	5	66	32	6.2	NW	78	0.5
March	7.63	8	53	25	7.3	W	80	0.2
April	10.06	11	43	23	7.6	W	81	Trace.
May	12.26	13	43	21	6.9	W	84	0
June	13.24	14	45	21	6.4	SE	85	0
July	12.02	13	61	32	6.0	SE	75	0
August	10.35	11	67	37	5.1	SE	76	0
September	8.38	9	66	39	5.1	SE	83	0
October	6.11	6	64	37	4.7	SE	82	0
November	3.72	4	70	42	4.7	N	83	0.5
December	2.64	3	78	50	4.9	N	73	0.8
Year	93.74		61	33	5.9	SE	80	2.5

[1]Recorded in the period 1918-65.
[2]Recorded in the period 1914-43.
[3]Recorded in the period 1914-67.
[4]Recorded in the period 1929-59.
[5]Recorded in the period 1899-65.

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
Ad	Adelino sandy clay loam	1,678	0.1
Ae	Adelino clay loam	1,385	0.1
AF	Aftaden-Rock outcrop association	41,951	2.1
Ag	Agua loam	8,319	0.4
Ah	Agua clay loam	652	*
AJ	Agua Variant soils, moderately wet	619	*
AK	Agua Variant and Belen Variant soils	1,864	0.1
AL	Akela-Rock outcrop complex	87,824	4.4
AM	Aladdin-Coxwell association	8,633	0.4
An	Anapra silt loam	601	*
Ao	Anapra clay loam	7,131	0.4
Ap	Anthony-Vinton fine sandy loams	5,788	0.3
Ar	Anthony-Vinton loams	6,715	0.3
As	Anthony-Vinton clay loams	2,058	0.1
At	Armijo loam	200	*
Aw	Armijo clay loam	3,566	0.2
Ax	Armijo clay	3,387	0.2
Be	Belen loam	213	*
Bf	Belen clay loam	2,380	0.1
Bg	Belen clay	8,350	0.4
BH	Belen Variant soils	370	*
BJ	Berino-Bucklebar association	81,289	4.1
BK	Berino-Dona Ana association	43,558	2.2
BL	Berino-Pintura complex	62,085	3.1
Bm	Bluepoint loamy sand, 1 to 5 percent slopes	39,342	2.0
Bn	Bluepoint loamy sand, 5 to 15 percent slopes	16,183	0.8
BO	Bluepoint loamy sand, 1 to 15 percent slopes	23,370	1.2
BP	Bluepoint-Caliza-Yturbide complex	96,104	4.9
Br	Brazito loamy fine sand	6,722	0.3
Bs	Brazito very fine sandy loam, thick surface	6,677	0.3
CA	Cacique-Cruces association	42,536	2.2
Cb	Canutio and Arizo gravelly sandy loams	5,766	0.3
CH	Cave-Harrisburg association	11,547	0.6
DR	Dona Ana-Reagan association	51,753	2.6
DS	Dumps	163	*
Ge	Glendale loam	7,821	0.4
Gf	Glendale clay loam	19,996	1.0
Gg	Glendale clay loam, alkali	595	*
HD	Haplargids, dissected	6,996	0.4
Hf	Harkey fine sandy loam	584	*
Hg	Harkey loam	18,691	0.9
Hh	Harkey loam, saline-alkali	297	*
Hk	Harkey clay loam	7,462	0.4
MN	Masonfort-Nickel association	48,993	2.5
Mo	Mimbres silty clay loam	25,346	1.3
MR	Minlith-Rock outcrop association	27,014	1.4
MS	Motoqua-Rock outcrop association	58,587	3.0
NB	Nickel-Badland complex	49,554	2.5
NU	Nickel-Upton association	78,539	4.0
OP	Onite-Pajarito association	92,244	4.7
OR	Onite-Pintura complex	56,258	2.8
Pa	Pajarito fine sandy loam	9,010	0.5
Pb	Pajarito-Pintura complex	13,052	0.7
PN	Pinaleno-Nolam association	21,741	1.1
RE	Riverwash	2,685	0.1
RF	Riverwash-Arizo complex	3,100	0.2
RG	Rock outcrop-Argids association	61,816	3.1
RH	Rock outcrop-Argids, cool, association	16,136	0.8
RL	Rock outcrop-Lozier association	32,865	1.7
RT	Rock outcrop-Torriorthents association	104,585	5.3
SH	Simona-Harrisburg association	92,436	4.7
ST	Stellar association	8,295	0.4
TE	Tencee-Upton association	79,275	4.0
TF	Terino-Casito association	22,586	1.1
Vf	Vinton Variant fine sandy loam	293	*
Vg	Vinton Variant sandy clay loam	436	*
WH	Wink-Harrisburg association	143,501	7.3
WP	Wink-Pintura complex	187,555	9.5
	Lakes	67	*
	Total	1,979,190	100.0

* Less than 0.1 percent.

TABLE 5.--YIELDS PER ACRE OF IRRIGATED CROPS

[Yields are those that can be expected under a high level of management. Only those soils that are farmed are listed. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil]

Soil name and map symbol	Alfalfa hay	Barley	Cotton lint	Lettuce	Onions	Fresh chili peppers	Wheat
	Ton	Bu	Lb	Crate	Sack	Ton	Bu
Ad, Ae---------- Adelino	8	80	1,300	---	---	10	80
Ag*, Ah*---------- Agua	7	---	1,000	---	---	10	75
An, Ao---------- Anapra	8	90	1,200	---	---	---	---
Ap*, Ar*, As*---------- Anthony-Vinton	6.6	66	960	---	---	---	---
At*, Aw*, Ax*---------- Armijo	5	70	900	---	---	---	52
Be, Bf---------- Belen	4.5	71	750	---	---	---	---
Bg---------- Belen	6.5	65	825	---	---	---	---
Br---------- Brazito	5	---	---	---	---	---	---
Bs---------- Brazito	5	---	---	---	---	---	---
Ge*, Gf*---------- Glendale	9	70	750	---	---	---	---
Gg*---------- Glendale	4	35	---	---	---	---	---
Hf---------- Harkey	8	80	1,300	400	700	9	---
Hg---------- Harkey	9	90	1,500	500	800	10	---
Hh*---------- Harkey	4	40	---	---	---	---	---
Hk---------- Harkey	9	90	1,500	500	800	10	---
Pa---------- Pajarito	8	---	1,200	---	---	10	---
Vf*, Vg*---------- Vinton Variant	7	88	---	420	---	8	64

* Yields are for areas protected from flooding.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES

[Only the soils that support rangeland vegetation suitable for grazing are listed]

Soil name and map symbol	Range site	Total production		Characteristic species	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
Ad, Ae---------- Adelino	Loamy----------	Favorable Normal Unfavorable	675 475 175	Black grama---------- Blue grama---------- Bush muhly---------- Tobosa---------- Threeawn---------- Longleaf ephedra---------- Broom snakeweed---------- Sand dropseed---------- Mesa dropseed----------	20 20 15 10 5 5 5 5 5
AF*:					
Aftaden----------	Shallow Sandy----------	Favorable Normal Unfavorable	700 500 200	Black grama---------- Bush muhly---------- Threeawn---------- Mesa dropseed---------- Sand dropseed---------- Winterfat---------- Tobosa---------- Yucca----------	45 5 5 5 5 5 5 5
Rock outcrop.					
Onite----------	Sandy----------	Favorable Normal Unfavorable	650 450 175	Black grama---------- Mesa dropseed---------- Bush muhly---------- Sand dropseed---------- Plains bristlegrass---------- Threeawn---------- Soaptree yucca---------- Broom snakeweed----------	20 15 5 5 5 5 5 5
AJ*---------- Agua Variant	Salt Meadow----------	Favorable Normal Unfavorable	1,800 1,400 1,000	Giant sacaton---------- Alkali sacaton---------- Inland saltgrass---------- Vine-mesquite---------- Seep willow---------- Screwbean mesquite---------- Tobosa---------- Feathergrass----------	35 15 10 10 5 5 5 5
AK*:					
Agua Variant------	Salt Meadow----------	Favorable Normal Unfavorable	1,800 1,400 1,000	Giant sacaton---------- Alkali sacaton---------- Inland saltgrass---------- Vine-mesquite---------- Seep willow---------- Screwbean mesquite---------- Tobosa---------- Feathergrass----------	35 15 10 10 5 5 5 5
Belen Variant-----	Salt Meadow----------	Favorable Normal Unfavorable	1,800 1,400 1,000	Giant sacaton---------- Alkali sacaton---------- Inland saltgrass---------- Vine-mesquite---------- Seepwillow---------- Screwbean mesquite---------- Tobosa---------- Feathergrass----------	35 15 10 10 5 5 5 5

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site	Total production		Characteristic species	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
AL*:					
Akela	Malpais	Favorable	750	Black grama	25
		Normal	500	Bush muhly	15
		Unfavorable	200	Sideoats grama	10
				Mesa dropseed	10
				Fourwing saltbush	5
				Blue grama	5
				Winterfat	5
				Tobosa	5
Rock outcrop.					
AM*:					
Aladdin	Sandy	Favorable	750	Black grama	25
		Normal	525	Sand dropseed	10
		Unfavorable	250	Mesa dropseed	10
				Bush muhly	5
				Sideoats grama	5
				Threeawn	5
				Broom snakeweed	5
				Soaptree yucca	5
				Littleleaf sumac	5
				New Mexico feathergrass	5
Coxwell	Gravelly Loam	Favorable	750	Black grama	30
		Normal	550	Bush muhly	10
		Unfavorable	225	Threeawn	10
				Sideoats grama	5
				Arizona cottontop	5
				Cane bluestem	5
				Winterfat	5
				Yucca	5
				Tobosa	5
BH*	Salt Meadow	Favorable	1,500	Giant sacaton	35
Belen Variant		Normal	1,400	Alkali sacaton	15
		Unfavorable	1,000	Inland saltgrass	10
				Vine-mesquite	10
				Seepwillow	5
				Tobosa	5
				Feathergrass	5
				Screwbean mesquite	5
BJ*:					
Berino	Sandy	Favorable	700	Black grama	25
		Normal	500	Mesa dropseed	15
		Unfavorable	250	Sand dropseed	10
				Bush muhly	5
				Broom snakeweed	5
				Hairy grama	5
				Soaptree yucca	5
				Plains bristlegrass	5
				Threeawn	5
Bucklebar.					
Dona Ana.					

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site	Total production		Characteristic species	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
BK*:					
Berino	Sandy	Favorable	700	Black grama	25
		Normal	500	Mesa dropseed	15
		Unfavorable	250	Sand dropseed	10
				Bush muhly	5
				Broom snakeweed	5
				Hairy grama	5
				Soaptree yucca	5
				Plains bristlegrass	5
				Threeawn	5
Dona Ana.					
BL*:					
Berino	Sandy	Favorable	700	Black grama	25
		Normal	500	Mesa dropseed	15
		Unfavorable	250	Sand dropseed	10
				Bush muhly	5
				Broom snakeweed	5
				Hairy grama	5
				Soaptree yucca	5
				Plains bristlegrass	5
				Threeawn	5
Pintura	Deep Sand	Favorable	600	Giant dropseed	15
		Normal	350	Mesa dropseed	15
		Unfavorable	150	Bush muhly	10
				Threeawn	10
				Sand sagebrush	10
				Plains bristlegrass	5
				Soaptree yucca	5
				Fourwing saltbush	5
				Broom dalea	5
Bm, Bn, BO--Bluepoint	Deep Sand	Favorable	600	Spike dropseed	15
		Normal	350	Mesa dropseed	15
		Unfavorable	150	Bush muhly	5
				Fourwing saltbush	5
				Black grama	5
				Giant dropseed	5
				Sand sagebrush	5
				Broom dalea	5
BP*:					
Bluepoint	Deep Sand	Favorable	600	Spike dropseed	15
		Normal	350	Mesa dropseed	15
		Unfavorable	150	Giant dropseed	15
				Fourwing saltbush	10
				Bush muhly	5
				Black grama	5
				Sand sagebrush	5
				Broom dalea	5
Caliza	Gravelly Sand	Favorable	475	Mesa dropseed	20
		Normal	175	Black grama	15
		Unfavorable	75	Bush muhly	15
				Creosotebush	15
				Broom dalea	5
				Fourwing saltbush	5

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site	Total production		Characteristic species	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
BP*:					
Yturbide	Deep Sand	Favorable	600	Giant dropseed	15
		Normal	350	Sand dropseed	15
		Unfavorable	150	Sand sagebrush	10
				Black grama	5
				Mesa dropseed	5
				Bush muhly	5
				Broom dalea	5
				Fourwing saltbush	5
				Soaptree yucca	5
CA*:					
Cacique	Sandy	Favorable	600	Black grama	20
		Normal	375	Mesa dropseed	15
		Unfavorable	250	Tobosa	10
				Bush muhly	5
				Sand dropseed	5
				Plains bristlegrass	5
				Hairy grama	5
				Soaptree yucca	5
				Broom snakeweed	5
				Threeawn	5
Cruces	Shallow Sandy	Favorable	750	Black grama	50
		Normal	525	Sand dropseed	5
		Unfavorable	275	Mesa dropseed	5
				Bush muhly	5
				Soaptree yucca	5
				Longleaf ephedra	5
				New Mexico feathergrass	5
				Sand sagebrush	5
				Threeawn	5
Simona	Shallow Sandy	Favorable	750	Black grama	50
		Normal	525	Mesa dropseed	10
		Unfavorable	275	Bush muhly	5
				Longleaf ephedra	5
				Blue grama	5
				Winterfat	5
				Sand dropseed	5
				Tobosa	5
				Threeawn	5
				Soaptree yucca	5
Cb*:					
Canutio	Gravelly Sand	Favorable	475	Mesa dropseed	20
		Normal	300	Black grama	15
		Unfavorable	100	Creosotebush	15
				Bush muhly	15
				Plains bristlegrass	5
				Broom dalea	5
Arizo.					
CH*:					
Cave	Gravelly	Favorable	500	Black grama	20
		Normal	375	Bush muhly	20
		Unfavorable	125	Creosotebush	15
				Winterfat	10
				Arizona cottontop	5
				Cane bluestem	5
				Slim tridens	5
				Mesa dropseed	5
				Mariola	5
				Tarbush	5
				Littleleaf sumac	5

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site	Total production		Characteristic species	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
CH*:					
Harrisburg	Sandy	Favorable	700	Black grama	25
		Normal	500	Mesa dropseed	15
		Unfavorable	225	Sand dropseed	5
				Bush muhly	5
				Threeawn	5
				Yucca	5
				Longleaf ephedra	5
DR*:					
Dona Ana	Loamy	Favorable	675	Black grama	20
		Normal	475	Bush muhly	15
		Unfavorable	175	Mesa dropseed	5
				Sand dropseed	5
				Soaptree yucca	5
				Broom snakeweed	5
				Fourwing saltbush	5
Reagan.					
MN*:					
Masonfort	Limy	Favorable	550	Black grama	30
		Normal	400	Bush muhly	10
		Unfavorable	150	Threeawn	5
				Creosotebush	5
				Broom snakeweed	5
				Winterfat	5
				Mariola	5
				Fourwing saltbush	5
Nickel	Gravelly	Favorable	500	Black grama	20
		Normal	375	Bush muhly	20
		Unfavorable	125	Creosotebush	15
				Arizona cottontop	5
				Cane bluestem	5
				Slim tridens	5
				Mesa dropseed	5
				Mariola	5
				Tarbush	5
				Winterfat	5
				Littleleaf sumac	5
Mo	Bottomland	Favorable	3,000	Giant sacaton	25
Mimbres		Normal	2,000	Alkali sacaton	20
		Unfavorable	750	Vine-mesquite	10
				Tobosa	5
MR*:					
Minlith	Shallow Sandy	Favorable	650	Black grama	45
		Normal	475	Mesa dropseed	10
		Unfavorable	200	Bush muhly	5
				Tobosa	5
				Threeawn	5
				Soaptree yucca	5
Rock outcrop.					
Onite	Sandy	Favorable	650	Black grama	20
		Normal	450	Mesa dropseed	15
		Unfavorable	175	Bush muhly	5
				Sand dropseed	5
				Plains bristlegrass	5
				Threeawn	5
				Soaptree yucca	5
				Broom snakeweed	5

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site	Total production		Characteristic species	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
MS*:					
Motoqua	Igneous Hills and Mountains	Favorable	800	Black grama	25
		Normal	600	Bush muhly	15
		Unfavorable	200	Sideoats grama	10
				New Mexico feathergrass	10
				Blue grama	5
				Cane bluestem	5
				Green spangletop	5
				Sotol	5
				Oak	5
				Oneseed juniper	5
Rock outcrop.					
NB*:					
Nickel	Gravelly	Favorable	500	Black grama	20
		Normal	375	Bush muhly	20
		Unfavorable	125	Creosotebush	15
				Arizona cottontop	5
				Cane bluestem	5
				Slim tridens	5
				Mesa dropseed	5
				Mariola	5
				Tarbush	5
				Winterfat	5
				Littleleaf sumac	5
Badland.					
NU*:					
Nickel	Gravelly	Favorable	500	Black grama	20
		Normal	375	Bush muhly	20
		Unfavorable	125	Creosotebush	15
				Arizona cottontop	5
				Cane bluestem	5
				Slim tridens	5
				Mesa dropseed	5
				Mariola	5
				Tarbush	5
				Winterfat	5
				Littleleaf sumac	5
Upton.					
OP*:					
Onite	Sandy	Favorable	650	Black grama	20
		Normal	450	Mesa dropseed	15
		Unfavorable	175	Bush muhly	5
				Sand dropseed	5
				Plains bristlegrass	5
				Threeawn	5
				Soaptree yucca	5
				Broom snakeweed	5
Pajarito	Sandy	Favorable	600	Black grama	20
		Normal	475	Sand dropseed	10
		Unfavorable	175	Mesa dropseed	10
				Threeawn	10
				Galleta	10
				Bush muhly	5
				Soaptree yucca	5
				Spike dropseed	5
				Plains bristlegrass	5
				Broom snakeweed	5

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site	Total production		Characteristic species	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
OP*:					
Pintura	Deep Sand	Favorable	640	Giant dropseed	15
		Normal	350	Mesa dropseed	15
		Unfavorable	150	Bush muhly	10
				Sand sagebrush	10
				Threeawn	5
				Plains bristlegrass	5
				Soaptree yucca	5
				Fourwing saltbush	5
				Broom dalea	5
OR*:					
Onite	Sandy	Favorable	650	Black grama	20
		Normal	450	Mesa dropseed	15
		Unfavorable	175	Bush muhly	5
				Sand dropseed	5
				Plains bristlegrass	5
				Threeawn	5
				Soaptree yucca	5
				Broom snakeweed	5
Pintura	Deep Sand	Favorable	640	Giant dropseed	15
		Normal	350	Mesa dropseed	15
		Unfavorable	150	Bush muhly	10
				Sand sagebrush	10
				Threeawn	5
				Plains bristlegrass	5
				Soaptree yucca	5
				Fourwing saltbush	5
				Broom dalea	5
Pa	Sandy	Favorable	600	Black grama	20
Pajarito		Normal	475	Sand dropseed	10
		Unfavorable	175	Mesa dropseed	10
				Threeawn	10
				Galleta	10
				Bush muhly	5
				Soaptree yucca	5
				Spike dropseed	5
				Plains bristlegrass	5
				Broom snakeweed	5
Pb*:					
Pajarito	Sandy	Favorable	600	Black grama	20
		Normal	450	Mesa dropseed	20
		Unfavorable	175	Spike dropseed	10
				Bush muhly	10
				Sand dropseed	5
				Threeawn	5
				Annual forbs	5
				Sand sagebrush	5
Pintura	Deep Sand	Favorable	600	Giant dropseed	15
		Normal	350	Mesa dropseed	15
		Unfavorable	150	Bush muhly	10
				Sand sagebrush	10
				Threeawn	5
				Plains bristlegrass	5
				Soaptree yucca	5
				Fourwing saltbush	5
				Broom dalea	5

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site	Total production		Characteristic species	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
PN*:					
Pinaleno	Gravelly Loam	Favorable	850	Black grama	30
		Normal	600	Bush muhly	15
		Unfavorable	125	Threeawn	10
				Sideoats grama	5
				Tobosa	5
Nolam.					
RF*:					
Riverwash.					
Arizo	Gravelly Sand	Favorable	500	Mesa dropseed	20
		Normal	325	Black grama	15
		Unfavorable	125	Bush muhly	15
				Creosotebush	10
				Fluffgrass	5
RL*:					
Rock outcrop.					
Lozier	Limestone Hills	Favorable	700	Black grama	25
		Normal	500	Gyp grama	10
		Unfavorable	300	Sideoats grama	5
				Slim tridens	5
				Bush muhly	5
				Cane bluestem	5
				Tanglehead	5
SH*:					
Simona	Shallow Sandy	Favorable	750	Black grama	50
		Normal	525	Mesa dropseed	10
		Unfavorable	275	Bush muhly	5
				Longleaf ephedra	5
				Blue grama	5
				Winterfat	5
				Sand dropseed	5
				Tobosa	5
				Threeawn	5
				Soaptree yucca	5
Harrisburg	Sandy	Favorable	750	Black grama	25
		Normal	525	Mesa dropseed	15
		Unfavorable	125	Sand dropseed	5
				Bush muhly	5
				Threeawn	5
				Yucca	5
				Longleaf ephedra	5
ST*:					
Stellar	Clayey	Favorable	600	Black grama	25
		Normal	475	Alkali sacaton	20
		Unfavorable	200	Mesa dropseed	10
				Tobosa	10
				Bush muhly	5
				Sideoats grama	5
				Broom snakeweed	5
				Soaptree yucca	5
				Fourwing saltbush	5
Stellar	Bottomland	Favorable	3,000	Giant sacaton	25
		Normal	2,000	Alkali sacaton	20
		Unfavorable	750	Tobosa	10
				Vine mesquite	5
				Bush muhly	5
				Sideoats grama	5
				Cane bluestem	5

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site	Total production		Characteristic species	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
TE*:					
Tencee	Gravelly	Favorable	500	Black grama	20
		Normal	375	Bush muhly	20
		Unfavorable	125	Creosotebush	10
				Mariola	5
				Sand dropseed	5
				Fluffgrass	5
				Plains bristlegrass	5
				Broom snakeweed	5
				Buckwheat	5
Upton.					
TF*:					
Terino	Gravelly	Favorable	500	Black grama	20
		Normal	375	Bush muhly	20
		Unfavorable	125	Plains bristlegrass	5
				Threeawn	5
				Cane bluestem	5
				American tarbush	5
				Creosotebush	5
				Mariola	5
Casito	Gravelly	Favorable	500	Black grama	25
		Normal	375	Bush muhly	20
		Unfavorable	100	Creosotebush	15
				Plains bristlegrass	5
				Threeawn	5
				Fluffgrass	5
				American tarbush	5
				Mariola	5
TF*:					
Pinaleno	Gravelly Loam	Favorable	850	Black grama	30
		Normal	600	Bush muhly	15
		Unfavorable	125	Threeawn	10
				Sideoats grama	5
				Tobosa	5
WH*:					
Wink	Sandy	Favorable	650	Black grama	25
		Normal	550	Bush muhly	20
		Unfavorable	200	Spike dropseed	5
				Mesa dropseed	5
				Sand dropseed	5
				Plains bristlegrass	5
				Annual forbs	5
Harrisburg	Sandy	Favorable	700	Black grama	25
		Normal	500	Mesa dropseed	15
		Unfavorable	225	Sand dropseed	5
				Bush muhly	5
				Threeawn	5
				Yucca	5
				Longleaf ephedra	5
Simona	Shallow Sandy	Favorable	750	Black grama	50
		Normal	525	Mesa dropseed	10
		Unfavorable	275	Bush muhly	5
				Longleaf ephedra	5
				Blue grama	5
				Winterfat	5
				Sand dropseed	5
				Tobosa	5
				Threeawn	5
				Soaptree yucca	5

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site	Total production		Characteristic species	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
WP*:					
Wink	Sandy	Favorable	600	Black grama	20
		Normal	475	Bush muhly	15
		Unfavorable	125	Soaptree yucca	5
				Spike dropseed	5
				Mesa dropseed	5
				Plains bristlegrass	5
				Annual forbs	5
Pintura	Deep Sand	Favorable	600	Giant dropseed	15
		Normal	350	Mesa dropseed	15
		Unfavorable	150	Bush muhly	10
				Sand sagebrush	10
				Threeawn	5
				Plains bristlegrass	5
				Soaptree yucca	5
				Fourwing saltbush	5
				Broom dalea	5

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Ad, Ae Adelino	Slight.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, low strength.
AF*: Aftaden	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.
Rock outcrop.					
Onite	Slight	Slight	Slight	Slight	Slight.
Ag, Ah Agua	Severe: cutbanks cave.	Slight	Slight	Slight	Moderate: low strength.
AJ* Agua Variant	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
AK*: Agua Variant	Severe: wetness, cutbanks cave. cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Belen Variant	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.
AL*: Akela	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
Rock outcrop.					
Akela	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.
AM*: Aladdin	Slight.	Slight.	Slight	Moderate: slope.	Slight.
Coxwell	Moderate: depth to rock.	Slight	Moderate: depth to rock.	Severe: slope.	Moderate: slope.
An, Ao Anapra	Severe: cutbanks cave.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.
Ap*, Ar*, As*: Anthony	Severe: cutbanks cave.	Slight	Slight	Slight	Slight.
Vinton	Severe: cutbanks cave.	Slight	Slight	Slight	Slight.
At, Aw, Ax Armijo	Moderate: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Be, Bf, Bg--------- Belen	Moderate: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
BH*---------- Belen Variant	Severe: wetness.	Severe: wetness, shrink-swell, low strength.	Severe: wetness, shrink-swell, low strength.	Severe: wetness, shrink-swell, low strength.	Severe: wetness, shrink-swell, low strength.
BJ*: Berino----------	Slight----------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, low strength.
Bucklebar---------	Slight----------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.
Dona Ana----------	Slight----------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.
BK*: Berino----------	Slight----------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, low strength.
Dona Ana----------	Slight----------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.
BL*: Berino----------	Slight----------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, low strength.
Pintura----------	Severe: cutbanks cave.	Slight----------	Slight----------	Slight----------	Slight.
Bm---------- Bluepoint	Severe: floods, cutbanks cave.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods.
Bn, BO---------- Bluepoint	Severe: cutbanks cave,	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods.
BP*: Bluepoint--------	Severe: cutbanks cave, floods.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods.
Caliza----------	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Yturbide----------	Severe: cutbanks cave.	Slight----------	Slight----------	Moderate: slope.	Slight.
Br, Bs---------- Brazito	Severe: cutbanks cave.	Slight----------	Slight----------	Slight----------	Slight.
CA*: Cacique----------	Severe: cemented pan.	Moderate: cemented pan, shrink-swell.	Severe: cemented pan.	Moderate: cemented pan, shrink-swell.	Moderate: cemented pan, shrink-swell.
Cruces----------	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
CA*:					
Simona	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.
Cb*:					
Canutio	Severe: cutbanks cave.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
Arizo	Severe: floods, cutbanks cave.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
CH*:					
Cave	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.
Harrisburg	Severe: cemented pan.	Moderate: cemented pan.	Severe: cemented pan.	Moderate: cemented pan.	Moderate: cemented pan, low strength.
DR*:					
Dona Ana	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.
Reagan	Slight	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.
DS.					
Dumps					
Ge, Gf, Gg	Slight	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Severe: low strength.
Glendale					
HD*.					
Haplargids					
Hf, Hg	Slight	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.
Harkey					
Hh	Slight	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.
Harkey					
Hk	Slight	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.
Harkey					
MN*:					
Masonfort	Severe: depth to rock.	Moderate: depth to rock, slope.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope.
Nickel	Slight	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
Mo	Moderate: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods, low strength.
Mimbres					
MR*:					
Minlith	Severe: depth to rock, cutbanks cave.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.
Rock outcrop.					

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
MR*: Onite	Slight	Slight	Slight	Slight	Slight.
MS*: Motoqua	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.
Rock outcrop.					
NB*: Nickel	Slight	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
Badland.					
NU*: Nickel	Slight	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
Upton	Severe: cemented pan.	Moderate: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Moderate: cemented pan.
OP*: Onite	Slight	Slight	Slight	Slight	Slight.
Pajarito	Slight	Slight	Slight	Slight	Slight.
Pintura	Severe: cutbanks cave.	Slight	Slight	Slight	Slight.
OR*: Onite	Slight	Slight	Slight	Slight	Slight.
Pintura	Severe: cutbanks cave.	Slight	Slight	Slight	Slight.
Pa Pajarito	Slight	Slight	Slight	Slight	Slight.
Pb*: Pajarito	Slight	Slight	Slight	Slight	Slight.
Pintura	Severe: cutbanks cave.	Slight	Slight	Slight	Slight.
PN*: Pinaleno	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight.
Nolam	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight.
RE. Riverwash					
RF*: Riverwash.					
Arizo	Severe: floods, cutbanks cave.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
RG*: Rock outcrop.					

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
RG*:					
Argids.					
RH*:					
Rock outcrop.					
Argids.					
RL*:					
Rock outcrop.					
Lozier	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope.
RT*:					
Rock outcrop.					
Torriorthents.					
SH*:					
Simona	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.
Harrisburg	Severe: cemented pan.	Moderate: cemented pan.	Severe: cemented pan.	Moderate: slope, cemented pan.	Moderate: cemented pan, low strength.
ST*:					
Stellar	Moderate: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
Stellar, flooded	Severe: floods.	Severe: floods, shrink-swell, low strength.	Severe: floods, shrink-swell, low strength.	Severe: floods, low strength, shrink-swell.	Severe: floods, low strength, shrink-swell.
TE*:					
Tencee	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan, slope.	Severe: cemented pan.
Upton	Severe: cemented pan.	Moderate: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Moderate: cemented pan.
TF*:					
Terino	Severe: cemented pan.	Moderate: cemented pan.	Severe: cemented pan.	Moderate: cemented pan, slope.	Moderate: cemented pan.
Casito	Severe: cemented pan.	Moderate: cemented pan.	Severe: cemented pan.	Moderate: cemented pan, slope.	Moderate: cemented pan.
Pinaleno	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight.
Vf Vinton Variant	Severe: cutbanks cave.	Slight	Slight	Slight	Slight.
Vg Vinton Variant	Severe: cutbanks cave.	Slight	Moderate: shrink-swell	Slight	Moderate: low strength, shrink-swell.
WH*:					
Wink	Slight	Slight	Slight	Slight	Slight.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
WH*:					
Harrisburg	Severe: cemented pan.	Moderate: cemented pan.	Severe: cemented pan.	Moderate: cemented pan.	Moderate: cemented pan, low strength.
Simona	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.
WP*:					
Wink	Slight	Slight	Slight	Slight	Slight.
Pintura	Severe: cutbanks cave.	Slight	Slight	Slight	Slight.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," and "fair." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Ad, Ae Adelino	Moderate: percs slowly.	Severe: seepage.	Moderate: too clayey.	Slight	Good.
AF*: Aftaden	Severe: depth to rock.	Severe: depth to rock, slope, seepage.	Severe: depth to rock.	Slight	Poor: thin layer.
Rock outcrop.					
Onite	Slight	Severe: seepage.	Slight	Slight	Good.
Ag, Ah Agua	Slight	Severe: seepage.	Severe: too sandy.	Slight	Fair: too sandy.
AJ* Agua Variant	Severe: wetness.	Severe: wetness, seepage.	Severe: wetness, seepage.	Severe: wetness, seepage.	Poor: wetness.
AK*: Agua Variant	Severe: wetness.	Severe: wetness, seepage.	Severe: wetness, seepage.	Severe: wetness, seepage.	Poor: wetness.
Belen Variant	Severe: wetness.	Severe: wetness, seepage.	Severe: wetness, seepage.	Severe: wetness, seepage.	Poor: wetness, too clayey.
AL*: Akela	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: thin layer, small stones.
Rock outcrop.					
Akela	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: slope.	Poor: thin layer, slope, small stones.
AM*: Aladdin	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: small stones.
Coxwell	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Moderate: slope.	Poor: small stones, thin layer.
An, Ao Anapra	Slight	Severe: seepage.	Moderate: too sandy.	Slight	Fair: too sandy.
Ap*, Ar*, As*: Anthony	Slight	Severe: seepage.	Slight	Slight	Good.
Vinton	Slight	Severe: seepage.	Moderate: too sandy.	Slight	Fair: too sandy.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
At, Aw, Ax---------- Armijo	Severe: percs slowly.	Slight----------	Moderate: too clayey.	Slight----------	Poor: too clayey.
Be, Bf, Bg---------- Belen	Severe: percs slowly.	Moderate: seepage.	Slight----------	Slight----------	Good.
BH*---------- Belen Variant	Severe: wetness.	Severe: wetness, seepage.	Severe: wetness, seepage.	Severe: wetness, seepage.	Poor: wetness.
BJ*:					
Berino----------	Moderate: percs slowly.	Moderate: seepage, slope.	Slight----------	Slight----------	Good.
Bucklebar----------	Moderate: percs slowly.	Moderate: seepage, slope.	Slight----------	Slight----------	Fair: too clayey.
Dona Ana----------	Moderate: percs slowly.	Moderate: seepage, slope.	Slight----------	Slight----------	Good.
BK*:					
Berino----------	Moderate: percs slowly.	Moderate: seepage, slope.	Slight----------	Slight----------	Good.
Dona Ana----------	Moderate: percs slowly.	Moderate: seepage, slope.	Slight----------	Slight----------	Good.
BL*:					
Berino----------	Moderate: percs slowly.	Moderate: seepage, slope.	Slight----------	Slight----------	Good.
Pintura----------	Slight----------	Severe: seepage.	Severe: too sandy.	Slight----------	Poor: too sandy.
Bm---------- Bluepoint	Moderate: floods.	Severe: floods, seepage.	Moderate: floods, too sandy.	Moderate: floods.	Fair: too sandy.
Bn, BO---------- Bluepoint	Moderate: slope.	Severe: floods, seepage.	Moderate: too sandy.	Moderate: slope.	Fair: too sandy, slope.
BP*:					
Bluepoint----------	Moderate: slope.	Severe: floods, seepage.	Moderate: too sandy.	Moderate: slope.	Fair: too sandy, slope.
Caliza----------	Severe: slope.	Severe: seepage, slope.	Severe: slope, too sandy.	Severe: slope.	Poor: small stones, slope, too sandy.
Yturbide----------	Slight----------	Severe: seepage.	Moderate: too sandy.	Slight----------	Fair: too sandy.
Br, Bs---------- Brazito	Slight----------	Severe: seepage.	Severe: too sandy.	Slight----------	Poor: too sandy.
CA*:					
Cacique----------	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Slight----------	Poor: thin layer.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
CA*:					
Cruces	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Slight	Poor: thin layer.
Simona	Severe: cemented pan.	Severe: cemented pan, seepage.	Severe: cemented pan.	Slight	Poor: thin layer.
Cb*:					
Canutio	Severe: floods.	Severe: seepage, floods.	Severe: floods.	Severe: floods.	Poor: small stones.
Arizo	Severe: floods.	Severe: floods, seepage.	Severe: floods.	Severe: floods,	Poor: small stones.
CH*:					
Cave	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Slight	Poor: thin layer.
Harrisburg	Severe: cemented pan.	Severe: cemented pan, seepage.	Severe: cemented pan.	Slight	Fair: thin layer.
DR*:					
Dona Ana	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
Reagan	Slight	Moderate: seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
DS. Dumps					
Ge, Gf, Gg Glendale	Severe: percs slowly.	Slight	Moderate: too clayey.	Slight	Fair: too clayey.
HD*. Haplargids					
Hf, Hg Harkey	Moderate: percs slowly.	Moderate: seepage.	Slight	Slight	Good.
Hh Harkey	Moderate: percs slowly.	Moderate: seepage.	Slight	Slight	Good.
Hk Harkey	Moderate: percs slowly.	Moderate: seepage.	Slight	Slight	Good.
MN*:					
Masonfort	Severe: depth to rock.	Severe: depth to rock, seepage, slope.	Severe: depth to rock.	Moderate: slope.	Poor: thin layer.
Nickel	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.	Poor: small stones.
Mo Mimbres	Severe: percs slowly, floods.	Severe: floods.	Severe: floods.	Severe: floods.	Good.
MR*:					
Minlith	Severe: depth to rock.	Severe: depth to rock, seepage, slope.	Severe: depth to rock.	Slight	Poor: thin layer, small stones.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
MR*:					
Rock outcrop.					
Onite	Slight	Severe: seepage.	Slight	Slight	Good.
MS*:					
Motoqua	Severe: depth to rock, slope.	Severe: depth to rock, large stones, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: thin layer, large stones, slope.
Rock outcrop.					
NB*:					
Nickel	Moderate: slope.	Severe: slope, small stones.	Slight	Moderate: slope.	Poor: small stones.
Badland.					
NU*:					
Nickel	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.	Poor: small stones.
Upton	Severe: cemented pan.	Moderate: slope, cemented pan, seepage.	Severe: cemented pan.	Slight	Poor: thin layer.
OP*:					
Onite	Slight	Severe: seepage.	Slight	Slight	Good.
Pajarito	Slight	Severe: seepage.	Slight	Slight	Good.
Pintura	Slight	Severe: seepage.	Severe: too sandy.	Slight	Poor: too sandy.
OR*:					
Onite	Slight	Severe: seepage.	Slight	Slight	Good.
Pintura	Slight	Severe: seepage.	Severe: too sandy.	Slight	Poor: too sandy.
Pa	Slight	Severe: seepage.	Slight	Slight	Good.
Pajarito					
Pb*:					
Pajarito	Slight	Severe: seepage.	Slight	Slight	Good.
Pb*:					
Pintura	Slight	Severe: seepage.	Severe: too sandy.	Slight	Poor: too sandy.
PN*:					
Pinaleno	Slight	Severe: seepage.	Slight	Slight	Poor: small stones.
Nolam	Slight	Severe: seepage.	Slight	Slight	Poor: small stones.
RE.					
Riverwash					

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
RF*: Riverwash.					
Arizo	Severe: floods.	Severe: floods, seepage.	Severe: floods.	Severe: floods.	Poor: small stones.
RG*: Rock outcrop.					
Argids.					
RH*: Rock outcrop.					
Argids.					
RL*: Rock outcrop.					
Lozier	Severe: depth to rock, slope.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope.	Severe: slope.	Poor: large stones, thin layer, slope.
RT*: Rock outcrop.					
Torriorthents.					
SH*: Simona	Severe: cemented pan.	Severe: cemented pan, seepage.	Severe: cemented pan.	Slight	Poor: thin layer.
Harrisburg	Severe: cemented pan.	Severe: cemented pan, seepage.	Severe: cemented pan.	Slight	Fair: thin layer.
ST*: Stellar	Severe: percs slowly.	Slight	Moderate: too clayey.	Slight	Fair: hard to pack.
Stellar, flooded	Severe: floods, percs slowly.	Severe: floods.	Severe: floods.	Severe: floods.	Fair: hard to pack.
TE*: Tencee	Severe: cemented pan.	Severe: cemented pan, slope.	Severe: cemented pan.	Moderate: slope.	Poor: small stones, thin layer.
Upton	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Slight	Poor: thin layer.
TF*. Terino	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Slight	Poor: thin layer, small stones.
Casito	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Slight	Poor: small stones, thin layer.
Pinaleno	Slight	Severe: seepage.	Slight	Slight	Poor: small stones.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Vf, Vg---------- Vinton Variant	Severe: percs slowly.	Severe: seepage.	Slight----------	Slight----------	Good.
WH*:					
Wink----------	Slight----------	Severe: seepage.	Slight----------	Slight----------	Good.
Harrisburg---------	Severe: cemented pan.	Severe: cemented pan, seepage.	Severe: cemented pan.	Slight----------	Fair: thin layer.
Simona----------	Severe: cemented pan.	Severe: cemented pan, seepage.	Severe: cemented pan.	Slight----------	Poor: thin layer.
WP*:					
Wink----------	Slight----------	Severe: seepage.	Slight----------	Slight----------	Good.
Pintura----------	Slight----------	Severe: seepage.	Severe: too sandy.	Slight----------	Poor: too sandy, seepage.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and "poor." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Ad, Ae---- Adelino	Fair: shrink-swell, low strength.	Unsuited----	Unsuited----	Fair: too clayey.
AF*: Aftaden----	Poor: thin layer.	Poor: excess fines.	Unsuited----	Poor: small stones, thin layer.
Rock outcrop.				
Onite----	Good----	Poor: excess fines.	Unsuited----	Fair: too sandy, small stones.
Ag---- Agua	Good----	Fair: excess fines.	Unsuited----	Good.
Ah---- Agua	Good----	Fair: excess fines.	Unsuited----	Fair: too clayey.
AJ*---- Agua Variant	Fair: wetness.	Fair: excess fines.	Unsuited----	Poor: excess salt, wetness.
AK*: Agua Variant----	Fair: wetness.	Fair: excess fines.	Unsuited----	Poor: excess salt, wetness.
Belen Variant----	Poor: wetness, low strength, shrink-swell.	Poor: excess fines.	Unsuited----	Poor: wetness, too clayey, excess salt.
AL*: Akela----	Poor: thin layer.	Poor: thin layer, excess fines, small stones.	Poor: thin layer, excess fines.	Poor: small stones, thin layer.
Rock outcrop.				
Akela----	Poor: thin layer.	Poor: thin layer, excess fines, small stones.	Poor: thin layer, excess fines.	Poor: slope, small stones.
AM*: Aladdin----	Good----	Poor: excess fines.	Unsuited----	Poor: small stones.
Coxwell----	Poor: thin layer.	Unsuited----	Unsuited----	Poor: small stones.
An, Ao---- Anapra	Fair: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
Ap*, Ar*: Anthony----	Good----	Poor: excess fines.	Unsuited----	Good.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Ap*, Ar*:				
Vinton	Good	Poor: excess fines.	Unsuited	Good.
As*:				
Anthony	Good	Poor: excess fines.	Unsuited	Fair: too clayey.
Vinton	Good	Poor: excess fines.	Unsuited	Fair: too clayey.
At, Aw, Ax, Armijo	Poor: low strength, shrink-swell.	Unsuited	Unsuited	Poor: too clayey.
Be, Bf, Bg, Belen	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Poor: too clayey.
BH*, Belen Variant	Poor: wetness, low strength, shrink-swell.	Poor: excess fines.	Unsuited	Poor: wetness, too clayey, excess salt.
BJ*:				
Berino	Fair: low strength, shrink-swell.	Unsuited	Unsuited	Fair: too clayey.
Bucklebar	Fair: shrink-swell, low strength.	Unsuited	Unsuited	Fair: too clayey.
Dona Ana	Fair: low strength, shrink-swell.	Unsuited	Unsuited	Fair: too clayey.
BK*:				
Berino	Fair: low strength, shrink-swell.	Unsuited	Unsuited	Fair: too clayey.
Dona Ana	Fair: low strength, shrink-swell.	Unsuited	Unsuited	Fair: too clayey.
BL*:				
Berino	Fair: low strength, shrink-swell.	Unsuited	Unsuited	Fair: too clayey.
Pintura	Good	Fair: excess fines.	Unsuited	Poor: too sandy.
Bm, Bn, BO, Bluepoint	Good	Poor: excess fines.	Unsuited	Poor: too sandy, excess sodium.
BP*:				
Bluepoint	Good	Poor: excess fines.	Unsuited	Poor: too sandy, excess sodium.
Caliza	Poor: slope.	Fair: excess fines.	Good	Poor: small stones, slope.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
BP*:				
Yturbide	Good	Fair: excess fines.	Unsuited	Poor: too sandy, small stones.
Br, Bs Brazito	Good	Fair: excess fines.	Unsuited	Poor: too sandy.
CA*:				
Cacique	Poor: thin layer.	Unsuited	Unsuited	Fair: thin layer.
Cruces	Poor: thin layer.	Unsuited	Unsuited	Poor: thin layer.
Simona	Poor: thin layer.	Unsuited	Unsuited	Poor: thin layer.
Cb*:				
Canutio	Good	Unsuited	Fair: excess fines, small stones.	Poor: small stones.
Arizo	Good	Fair: excess fines.	Fair: excess fines.	Poor: small stones, too sandy.
CH*:				
Cave	Poor: thin layer.	Unsuited	Unsuited	Poor: small stones, thin layer.
Harrisburg	Poor: thin layer.	Unsuited	Unsuited	Poor: thin layer.
DR*:				
Dona Ana	Fair: low strength, shrink-swell.	Unsuited	Unsuited	Fair: too clayey.
Reagan	Fair: low strength, shrink-swell.	Unsuited	Unsuited	Fair: too clayey.
DS. Dumps				
Ge Glendale	Poor: low strength.	Unsuited	Unsuited	Fair: too clayey.
Gf Glendale	Poor: low strength.	Unsuited	Unsuited	Fair: too clayey.
Gg Glendale	Poor: low strength.	Unsuited	Unsuited	Poor: excess salt, excess sodium.
HD*. Haplargids				
Hf, Hg Harkey	Fair: low strength.	Unsuited	Unsuited	Good.
Hh Harkey	Poor: excess salt.	Unsuited	Unsuited	Poor: excess salt.
Hk Harkey	Fair: low strength.	Unsuited	Unsuited	Fair: too clayey.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
MN*:				
Masonfort	Poor: thin layer.	Poor: excess fines, thin layer.	Poor: excess fines, thin layer.	Poor: small stones, thin layer.
Nickel	Good	Unsuited	Fair: excess fines.	Poor: small stones.
Mo Mimbres	Poor: low strength.	Unsuited	Unsuited	Fair: too clayey.
MR*:				
Minlith	Poor: thin layer.	Poor: thin layer.	Poor: thin layer.	Poor: small stones, thin layer.
Rock outcrop.				
Onite	Good:	Poor: excess fines.	Unsuited	Fair: too sandy, small stones.
MS*:				
Motoqua	Poor: thin layer, slope.	Unsuited	Unsuited	Poor: thin layer, large stones, slope.
Rock outcrop.				
NB*:				
Nickel	Good	Unsuited	Fair: excess fines.	Poor: small stones.
Badland.				
NU*:				
Nickel	Good	Unsuited	Fair: excess fines.	Poor: small stones.
Upton	Fair: thin layer.	Unsuited	Unsuited	Fair: thin layer, small stones.
OP*:				
Onite	Fair: low strength.	Poor: excess fines.	Unsuited	Fair: too sandy, small stones.
Pajarito	Good	Poor: excess fines.	Unsuited	Good.
Pintura	Good	Fair: excess fines.	Unsuited	Poor: area reclaim, too sandy.
OR*:				
Onite	Good	Poor: excess fines.	Unsuited	Fair: too sandy, small stones.
Pintura	Good	Fair: excess fines.	Unsuited	Poor: too sandy.
Pa Pajarito	Good	Poor: excess fines.	Unsuited	Good.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Pb*:				
Pajarito	Good	Poor: excess fines.	Unsuited	Fair: too sandy.
Pintura	Good	Fair: excess fines.	Unsuited	Poor: area reclaim, too sandy.
PN*:				
Pinaleno	Good	Poor: excess fines.	Poor: excess fines.	Poor: small stones.
Nolam	Good	Unsuited	Fair: excess fines.	Poor: small stones.
RE.				
Riverwash				
RF*:				
Riverwash.				
Arizo	Good	Fair: excess fines.	Fair: excess fines.	Poor: small stones, too sandy.
RG*:				
Rock outcrop.				
Argids.				
RH*:				
Rock outcrop.				
Argids.				
RL*:				
Rock outcrop.				
Lozier	Poor: thin layer, slope.	Unsuited: thin layer, excess fines.	Unsuited: thin layer, excess fines.	Poor: thin layer, large stones, slope.
RT*:				
Rock outcrop.				
Torriorthents.				
SH*:				
Simona	Poor: thin layer.	Unsuited	Unsuited	Poor: thin layer.
Harrisburg	Poor: thin layer.	Unsuited	Unsuited	Poor: thin layer.
ST*:				
Stellar	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Poor: too clayey.
Stellar, flooded	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Poor: too clayey.
TE*:				
Tencee	Poor: thin layer.	Unsuited	Unsuited	Poor: small stones, thin layer.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
TE*:				
Upton	Fair: thin layer.	Unsuited	Unsuited	Fair: thin layer, small stones.
TF*:				
Terino	Poor: thin layer.	Poor: excess fines, thin layer.	Poor: excess fines, thin layer.	Poor: small stones, thin layer.
Casito	Poor: thin layer.	Unsuited	Poor: excess fines, thin layer.	Poor: thin layer, small stones.
Pinaleno	Good	Poor: excess fines.	Poor: excess fines.	Poor: small stones.
Vf:				
Vinton Variant	Good	Unsuited	Unsuited	Fair: too sandy.
Vg:				
Vinton Variant	Fair: low strength, shrink-swell.	Unsuited	Unsuited	Fair: too clayey.
WH*:				
Wink	Good	Poor: excess fines.	Unsuited	Good.
Harrisburg	Poor: thin layer.	Unsuited	Unsuited	Poor: thin layer.
Simona	Poor: thin layer.	Unsuited	Unsuited	Poor: thin layer.
WP*:				
Wink	Good	Poor: excess fines.	Unsuited	Good.
Pintura	Good	Fair: excess fines.	Unsuited	Poor: too sandy.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. Absence of an entry indicates that the soil was not evaluated]

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions
Ad, Ae---------- Adelino	Seepage--------	Favorable------	No water--------	Favorable------	Favorable------	Erodes easily.
AF*: Aftaden----------	Depth to rock, slope, seepage.	Thin layer-----	No water--------	Depth to rock, slope.	Rooting depth, soil blowing.	Depth to rock, soil blowing.
Rock outcrop.						
Onite----------	Seepage--------	Seepage--------	No water--------	Slope----------	Slope, droughty, soil blowing.	Soil blowing, droughty.
Ag, Ah---------- Agua	Seepage--------	Seepage, piping.	No water--------	Cutbanks cave	Droughty-------	Droughty.
AJ*---------- Agua Variant	Seepage--------	Excess salt, seepage.	Salty water-----	Excess salt-----	Excess salt, wetness.	Wetness, too sandy.
AK*: Agua Variant-----	Seepage--------	Excess salt, seepage.	Salty water-----	Excess salt-----	Excess salt, wetness.	Wetness, too sandy.
Belen Variant-----	Seepage--------	Excess salt-----	Salty water-----	Wetness--------	Wetness, excess salt.	Wetness.
AL*: Akela----------	Depth to rock, slope.	Thin layer-----	No water--------	Slope, depth to rock.	Droughty, rooting depth, slope.	Depth to rock.
Rock outcrop.						
Akela----------	Depth to rock, slope.	Thin layer-----	No water--------	Slope, depth to rock.	Droughty, rooting depth, slope.	Slope, depth to rock.
AM*: Aladdin----------	Seepage--------	Seepage--------	No water--------	Slope----------	Droughty, slope.	Slope.
Coxwell----------	Slope----------	Favorable------	No water--------	Slope, depth to rock.	Slope, rooting depth, soil blowing.	Slope, soil blowing, depth to rock.
An, Ao---------- Anapra	Seepage--------	Seepage--------	Deep to water	Favorable------	Favorable------	Favorable.
Ap*, Ar*, As*: Anthony----------	Seepage--------	Piping, seepage.	No water--------	Favorable------	Droughty-------	Soil blowing, erodes easily.
Vinton----------	Seepage--------	Piping, seepage.	No water--------	Favorable------	Droughty, soil blowing.	Too sandy, soil blowing.
At, Aw, Ax-------- Armijo	Favorable------	Favorable------	Deep to water	Percs slowly---	Percs slowly---	Percs slowly.
Be, Bf, Bg-------- Belen	Favorable------	Hard to pack---	Deep to water	Percs slowly---	Percs slowly, erodes easily.	Percs slowly.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions
BH*----- Belen Variant	Seepage-----	Excess salt, hard to pack.	Salty water----	Wetness.	Wetness, excess salt.	Wetness.
BJ*: Berino-----	Seepage-----	Favorable-----	No water-----	Slope-----	Slope, soil blowing.	Soil blowing.
Bucklebar-----	Seepage, slope.	Favorable-----	No water-----	Slope-----	Soil blowing, slope.	Soil blowing.
Dona Ana-----	Seepage-----	Favorable-----	No water-----	Slope-----	Slope, soil blowing.	Soil blowing.
BK*: Berino-----	Seepage-----	Favorable-----	No water-----	Slope-----	Slope, soil blowing.	Soil blowing.
Dona Ana-----	Seepage-----	Favorable-----	No water-----	Slope-----	Slope, soil blowing.	Soil blowing.
BL*: Berino-----	Seepage-----	Favorable-----	No water-----	Slope-----	Slope, soil blowing.	Soil blowing.
Pintura-----	Seepage-----	Piping, seepage.	No water-----	Slope, cutbanks cave.	Slope, soil blowing, fast intake.	Soil blowing, too sandy.
Bm----- Bluepoint	Seepage-----	Piping-----	No water-----	Slope-----	Droughty, slope, fast intake.	Too sandy, soil blowing.
Bn, BO----- Bluepoint	Seepage, slope.	Piping-----	No water-----	Slope-----	Droughty, slope, fast intake.	Too sandy, soil blowing.
BP*: Bluepoint-----	Seepage, slope.	Piping-----	No water-----	Slope-----	Droughty, slope, fast intake.	Too sandy, soil blowing.
Caliza-----	Seepage, slope.	Seepage-----	No water-----	Slope-----	Droughty, seepage, slope.	Slope, too sandy.
Yturbide-----	Seepage-----	Seepage-----	No water-----	Slope-----	Slope, seepage.	Too sandy, soil blowing.
Br, Bs----- Brazito	Seepage-----	Seepage, piping.	No water-----	Cutbanks cave	Droughty, seepage, soil blowing.	Soil blowing, too sandy, droughty.
CA*: Cacique-----	Cemented pan---	Thin layer-----	No water-----	Cemented pan---	Rooting depth, soil blowing.	Cemented pan, soil blowing.
Cruces-----	Cemented pan---	Thin layer-----	No water-----	Slope, cemented pan.	Slope, rooting depth, droughty.	Cemented pan.
Simona-----	Seepage, cemented pan.	Thin layer-----	No water-----	Cemented pan---	Droughty, rooting depth.	Cemented pan, soil blowing.
Cb*: Canutio-----	Seepage-----	Seepage-----	No water-----	Floods-----	Slope, droughty, floods.	Slope, droughty.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions
Cb*: Arizo	Slope, seepage.	Seepage	No water	----	----	Too sandy.
CH*: Cave	Slope, cemented pan, seepage.	Thin layer	No water	Cemented pan	Slope, droughty, rooting depth.	Cemented pan, slope.
Harrisburg	Cemented pan, seepage, slope.	Piping, thin layer.	No water	Slope, cemented pan.	Slope, cemented pan, rooting depth.	Slope, cemented pan.
DR*: Dona Ana	Favorable	Favorable	No water	Slope	Slope, soil blowing.	Soil blowing.
Reagan	Seepage	Favorable	No water	Not needed	Favorable	Favorable.
DS. Dumps						
Ge, Gf Glendale	Favorable	Favorable	No water	Favorable	Erodes easily	Erodes easily.
Gg Glendale	Favorable	Excess sodium, excess salt.	No water	Excess sodium, excess salt.	Excess sodium, excess salt.	
HD*. Haplargids						
Hf Harkey	Favorable	Piping	No water	Favorable	Soil blowing	Favorable.
Hg Harkey	Favorable	Piping	No water	Favorable	Favorable	Erodes easily.
Hh Harkey	Favorable	Piping, excess sodium, excess salt.	No water	Excess sodium, excess salt.	Excess sodium, excess salt.	Erodes easily.
Hk Harkey	Favorable	Piping	No water	Favorable	Favorable	Favorable.
MN*: Masonfort	Depth to rock, seepage, slope.	Thin layer	No water	Depth to rock, slope.	Droughty, rooting depth, slope.	Depth to rock, slope.
Nickel	Seepage, slope.	Seepage	No water	----	----	Slope, droughty.
Mo Mimbres	Favorable	Favorable	No water	Floods,	Floods erodes easily.	Erodes easily.
MR*: Minlith	Depth to rock, seepage.	Thin layer, seepage, piping.	No water	Depth to rock, slope.	Droughty, rooting depth, slope.	Depth to rock, soil blowing, slope.
Rock outcrop.						
Onite	Seepage	Seepage	No water	Slope	Slope, droughty, soil blowing.	Soil blowing.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions
MS*:						
Motoqua	Depth to rock, slope.	Thin layer, large stones.	No water	Slope, depth to rock.	Slope, rooting depth, large stones.	Depth to rock, large stones.
Rock outcrop.						
NB*:						
Nickel	Seepage, slope.	Seepage	No water	---	---	Slope, droughty.
Badland.						
NU*:						
Nickel	Seepage, slope.	Seepage	No water	---	---	Slope, droughty.
Upton	Cemented pan	Thin layer	No water	Not needed	Rooting depth	Cemented pan.
OP*:						
Onite	Seepage	Seepage	No water	Slope	Slope, droughty, soil blowing.	Soil blowing.
Pajarito	Seepage	Seepage	No water	Slope	Soil blowing, slope.	Soil blowing.
Pintura	Seepage	Erodes easily, piping, seepage.	No water	Slope, cutbanks cave.	Slope, soil blowing, fast intake.	Soil blowing, too sandy.
OR*:						
Onite	Seepage	Seepage	No water	Slope	Slope, droughty, soil blowing.	Soil blowing.
Pintura	Seepage	Erodes easily, piping, seepage.	No water	Slope, cutbanks cave.	Slope, soil blowing, fast intake.	Soil blowing, too sandy.
Pa	Seepage	Seepage	No water	Slope	Soil blowing, slope.	Soil blowing.
Pajarito						
Pb*:						
Pajarito	Seepage	Seepage	No water	Favorable	Soil blowing	Soil blowing.
Pintura	Seepage	Erodes easily, piping, seepage.	No water	Slope, cutbanks cave.	Slope, soil blowing, fast intake.	Soil blowing, too sandy.
PN*:						
Pinaleno	Seepage, slope.	Seepage, piping.	No water	Slope	Droughty, seepage, slope.	Slope, droughty.
Nolam	Seepage	Seepage	No water	Slope	Droughty, slope.	Favorable.
RE.						
Riverwash						
RF*:						
Riverwash.						
Arizo	Seepage	Seepage	No water	---	---	Too sandy.
RG*:						
Rock outcrop.						
Argids.						

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions
RH*:						
Rock outcrop.						
Argids.						
RL*:						
Rock outcrop.						
Lozier	Depth to rock, slope.	Thin layer	No water	Depth to rock	Droughty, rooting depth, slope.	Depth to rock, large stones, slope.
RT*:						
Rock outcrop.						
Torriorthents.						
SH*:						
Simona	Seepage, cemented pan.	Thin layer	No water	Cemented pan	Droughty, rooting depth.	Cemented pan, soil blowing.
Harrisburg	Cemented pan, seepage, slope.	Piping, thin layer.	No water	Slope, cemented pan.	Slope, cemented pan, rooting depth.	Slope, cemented pan.
ST*:						
Stellar	Favorable	Favorable	No water	Percs slowly	Percs slowly	Percs slowly.
Stellar	Favorable	Favorable	No water	Floods, percs slowly.	Floods, percs slowly.	Percs slowly.
TE*:						
Tencee	Cemented pan, slope.	Piping, thin layer.	No water	Cemented pan, slope.	Droughty, rooting depth, slope.	Cemented pan, slope.
Upton	Cemented pan	Thin layer	No water	Cemented pan	Rooting depth	Cemented pan.
TF*:						
Terino	Cemented pan, seepage.	Thin layer, seepage.	No water	Cemented pan, slope.	Rooting depth, droughty, slope.	Cemented pan.
Casito	Cemented pan, slope.	Thin layer	No water	Cemented pan, slope.	Droughty, slope, soil blowing.	Cemented pan, droughty.
Pinaleno	Seepage, slope.	Seepage, piping.	No water	Slope	Droughty, seepage, slope.	Slope, droughty.
Vf, Vg Vinton Variant	Seepage	Piping	No water	Cutbanks cave, floods.	Droughty, floods.	Favorable.
WH*:						
Wink	Seepage	Piping, erodes easily.	No water	Not needed	Fast intake, droughty, erodes easily.	Erodes easily, too sandy.
Harrisburg	Cemented pan, seepage, slope.	Piping, thin layer.	No water	Slope, cemented pan.	Slope, cemented pan, rooting depth.	Slope, cemented pan.
Simona	Seepage, cemented pan.	Thin layer	No water	Cemented pan	Droughty, rooting depth.	Cemented pan, soil blowing.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions
WP*:						
Wink	Seepage	Piping, erodes easily.	No water	Not needed	Fast intake, droughty, erodes easily.	Erodes easily, too sandy.
Pintura	Seepage	Erodes easily, piping, seepage.	No water	Slope, cutbanks cave.	Slope, soil blowing, fast intake.	Soil blowing, too sandy.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Ad, Ae---------- Adelino	Slight----------	Slight----------	Moderate: too clayey.	Slight.
AF*: Aftaden----------	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock, slope.	Moderate: too sandy.
Rock outcrop.				
Onite----------	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.
Ag, Ah---------- Agua	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.
AJ*---------- Agua Variant	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
AK*: Agua Variant---------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Belen Variant---------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
AL*: Akela----------	Severe: small stones, depth to rock.	Severe: small stones, depth to rock.	Severe: depth to rock, slope, small stones.	Severe: small stones.
Rock outcrop.				
Akela----------	Severe: small stones, slope, depth to rock.	Severe: small stones, slope, depth to rock.	Severe: depth to rock, slope, small stones.	Severe: small stones.
AM*: Aladdin----------	Moderate: small stones.	Moderate: small stones.	Severe: slope, small stones.	Moderate: small stones.
Coxwell----------	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.
An, Ao---------- Anapra	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.
Ap*, Ar*: Anthony----------	Slight----------	Slight----------	Slight----------	Slight.
Vinton----------	Slight----------	Slight----------	Slight----------	Slight.
As*: Anthony----------	Slight----------	Slight----------	Moderate: too clayey.	Slight.
Vinton----------	Slight----------	Slight----------	Moderate: too clayey.	Slight.

See footnote at end of table.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
At---------- Armijo	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: percs slowly.	Slight.
Aw---------- Armijo	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: too clayey, percs slowly.	Slight.
Ax---------- Armijo	Moderate: percs slowly, too clayey.	Moderate: too clayey, percs slowly.	Severe: too clayey.	Moderate: too clayey.
Be---------- Belen	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.
Bf---------- Belen	Slight----------	Slight----------	Moderate: too clayey.	Slight.
Bg---------- Belen	Moderate: too clayey.	Moderate: too clayey.	Severe: too clayey.	Moderate: too clayey.
BH*---------- Belen Variant	Severe: wetness.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.
BJ*: Berino----------	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.
Bucklebar----------	Slight----------	Slight----------	Moderate: slope.	Slight.
Dona Ana----------	Slight----------	Slight----------	Moderate: slope.	Slight.
BK*: Berino----------	Slight----------	Slight----------	Moderate: slope.	Slight.
Dona Ana----------	Slight----------	Slight----------	Moderate: slope.	Slight.
BL*: Berino----------	Slight----------	Slight----------	Moderate: slope.	Slight.
Pintura----------	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.
Bm---------- Bluepoint	Severe: floods.	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.
Bn, BO---------- Bluepoint	Severe: floods.	Moderate: slope, too sandy.	Severe: slope.	Moderate: too sandy.
BP*: Bluepoint----------	Severe: floods.	Moderate: slope, too sandy.	Severe: slope.	Moderate: too sandy.
Caliza----------	Severe: slope.	Severe: slope.	Severe: small stones, slope.	Severe: slope.

See footnote at end of table.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
BP*: Yturbide	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, small stones.	Moderate: too sandy.
Br Brazito	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.
Bs Brazito	Moderate: too sandy.	Slight	Slight	Slight.
CA*: Cacique	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy, cemented pan.	Moderate: too sandy.
Cruces	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Moderate: too sandy.
Simona	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Moderate: too sandy.
Cb*: Canutio	Severe: small stones, floods.	Severe: small stones.	Severe: small stones, floods.	Severe: small stones.
Arizo	Severe: floods.	Moderate: floods, small stones.	Severe: floods, small stones.	Moderate: small stones.
CH*: Cave	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan, small stones.	Moderate: small stones.
Harrisburg	Slight	Slight	Moderate: cemented pan, slope.	Slight.
DR*: Dona Ana	Slight	Slight	Moderate: slope.	Slight.
Reagan	Slight	Slight	Moderate: slope, too clayey.	Slight.
DS. Dumps				
Ge Glendale	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.
Gf Glendale	Slight	Slight	Moderate: too clayey.	Slight.
Gg Glendale	Severe: floods.	Slight	Moderate: too clayey.	Slight.
HD*. Haplargids.				
Hf Harkey	Slight	Slight	Slight	Slight.
Hg, Hh Harkey	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.

See footnote at end of table.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Hk---------- Harkey	Slight----------	Slight----------	Moderate: too clayey.	Slight.
MN*: Masonfort----------	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock, slope.	Slight.
Nickel----------	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.
Mo---------- Mimbres	Severe: floods.	Moderate: floods.	Severe: floods.	Moderate: floods.
MR*: Minlith----------	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Moderate: too sandy.
Rock outcrop.				
Onite----------	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.
MS*: Motoqua----------	Severe: slope, large stones, depth to rock.	Severe: slope, large stones, depth to rock.	Severe: slope, depth to rock, large stones.	Severe: slope, large stones.
Rock outcrop.				
NB*: Nickel----------	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones.
Badland.				
NU*: Nickel----------	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Severe: small stones.
Upton----------	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan, small stones.	Moderate: small stones.
OP*: Onite----------	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.
Pajarito----------	Slight----------	Slight----------	Moderate: slope.	Slight.
Pintura----------	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
OR*: Onite----------	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.

See footnote at end of table.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
OR*:				
Pintura	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
Pa	Slight	Slight	Moderate: slope.	Slight.
Pajarito				
Pb*:				
Pajarito	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.
Pintura	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
PN*:				
Pinaleno	Severe: small stones.	Severe: small stones.	Severe: small stones.	Severe: small stones.
Nolam	Severe: small stones.	Severe: small stones.	Severe: small stones, slope.	Severe: small stones.
RE.				
Riverwash				
RF*:				
Riverwash.				
Arizo	Severe: floods.	Moderate: floods, small stones.	Severe: floods, small stones.	Moderate: small stones, floods.
RG*:				
Rock outcrop.				
Argids.				
RH*:				
Rock outcrop.				
Argids.				
RL*:				
Rock outcrop.				
Lozier	Severe: large stones, slope, depth to rock.	Severe: slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope, large stones.
RT*:				
Rock outcrop.				
Torriorthents.				
SH*:				
Simona	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Slight.
Harrisburg	Slight	Slight	Moderate: cemented pan, slope.	Slight.

See footnote at end of table.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
ST*:				
Stellar	Slight	Slight	Moderate: too clayey.	Slight.
Stellar, flooded	Severe: floods.	Moderate: floods.	Severe: floods.	Moderate: floods,
TE*:				
Tencee	Severe: small stones, cemented pan.	Severe: small stones, cemented pan.	Severe: cemented pan, slope, small stones.	Severe: small stones.
Upton	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan, small stones.	Moderate: small stones.
TF*:				
Terino	Severe: small stones, cemented pan.	Severe: small stones, cemented pan.	Severe: cemented pan, small stones.	Severe: small stones.
Casito	Severe: small stones, cemented pan.	Severe: small stones, cemented pan.	Severe: cemented pan, small stones.	Severe: small stones.
Pinaleno	Severe: small stones.	Severe: small stones.	Severe: small stones.	Severe: small stones.
Vf	Slight	Slight	Slight	Slight.
Vinton Variant				
Vg	Slight	Slight	Moderate: too clayey.	Slight.
Vinton Variant				
WH*:				
Wink	Slight	Slight	Slight	Slight.
Harrisburg	Moderate: too sandy.	Moderate: too sandy.	Moderate: cemented pan, slope.	Moderate: too sandy.
Simona	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Slight.
WP*:				
Wink	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.
Pintura	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--WILDLIFE HABITAT POTENTIALS

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
Ad, Ae---------- Adelino	Good	Good	Good	---	Fair	Good	Good	Good	---	Good	Fair.
AF*:											
Aftaden----------	Very poor.	Very poor.	Poor	---	Poor	---	---	Poor	---	---	Poor.
Rock outcrop.											
Onite----------	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
Ag, Ah---------- Agua	Good	Good	Good	---	Good	Very poor.	Very poor.	Good	---	Very poor.	Good.
AJ*---------- Agua Variant	Fair	Fair	Fair	---	Fair	Fair	Good	Fair	Fair	Good	Fair.
AK*:											
Agua Variant-------	Poor	Poor	Fair	---	Fair	Fair	Fair	Fair	Fair	Fair	Fair.
Belen Variant------	Poor	Poor	Poor	---	Fair	Fair	Fair	Poor	Fair	Fair	Poor.
AL*:											
Akela----------	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Rock outcrop.											
Akela----------	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
AM*:											
Aladdin----------	Poor	Poor	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Coxwell----------	Very poor.	Very poor.	Poor	---	Poor	---	---	Poor	---	---	Poor.
An, Ao---------- Anapra	Good	Good	Fair	---	Fair	Very poor.	Very poor.	Very poor.	---	Very poor.	Fair.
Ap*, Ar*, As*:											
Anthony----------	Good	Good	Good	---	Good	Very poor.	Very poor.	Good	---	Very poor.	Poor.
Vinton----------	Fair	Fair	Good	---	---	Very poor.	Very poor.	Fair	---	Very poor.	Good.
At, Aw, Ax---------- Armijo	Fair	Fair	Poor	---	Poor	Good	Good	Fair	---	Good	Poor.
Be, Bf---------- Belen	Good	Good	Poor	---	Poor	Good	Good	Fair	---	Good	Poor.
Bg---------- Belen	Fair	Fair	Poor	---	Poor	Good	Good	Fair	---	Good	Poor.
BH*---------- Belen Variant	Fair	Fair	Fair	---	Fair	Fair	Good	Fair	Fair	Fair	Fair.

See footnote at end of table.

TABLE 12.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
BJ*:											
Berino	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Poor	---	Very poor.	Poor.
Bucklebar	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
Dona Ana	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Poor	---	Very poor.	Poor.
BK*:											
Berino	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Poor	---	Very poor.	Poor.
Dona Ana	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Poor	---	Very poor.	Poor.
BL*:											
Berino	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Poor	---	Very poor.	Poor.
Pintura	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Bm Bluepoint	Fair	Fair	Poor	---	Poor	Very poor.	Very poor.	Fair	---	Very poor.	Poor.
Bn, BO Bluepoint	Fair	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Fair.
BP*:											
Bluepoint	Fair	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Fair.
Caliza	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
Yturbide	Very poor.	Poor	Poor	---	Very poor.	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
Br, Bs Brazito	Fair	Good	Poor	---	Poor	Poor	Very poor.	Fair	---	Very poor.	Poor.
CA*:											
Cacique	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
Cruces	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
Simona	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
Cb*:											
Canutio	Very poor.	Very poor.	Fair	---	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
Arizo	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
CH*:											
Cave	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
Harrisburg	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.

See footnote at end of table.

TABLE 12.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
DR*:											
Dona Ana	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Poor	---	Very poor.	Poor.
Reagan	Fair	Good	Fair	Very poor.	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
DS. Dumps											
Ge, Gf. Glendale	Good	Good	Good	---	Good	Very poor.	Very poor.	Good	---	Very poor.	Good.
Gg. Glendale	Fair	Fair	Poor	---	Poor	Very poor.	Very poor.	Fair	---	Very poor.	Poor.
HD*. Haplargids											
Hf, Hg. Harkey	Good	Good	Good	---	---	Fair	Fair	Good	---	Fair	Good.
Hh. Harkey	Fair	Fair	Good	---	Good	Fair	Fair	Fair	---	Fair	Good.
Hk. Harkey	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Very poor.	---	Very poor.	Poor.
MN*:											
Masonfort	Very poor.	Very poor.	Fair	---	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
Nickel	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
Mo. Mimbres	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
MR*:											
Minlith	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
Rock outcrop.											
Onite	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
MS*:											
Motoqua	Very poor.	Poor	Fair	Poor	Poor	---	---	Poor	Poor	---	Fair.
Rock outcrop.											
NB*:											
Nickel	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
Badland.											
NU*:											
Nickel	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
Upton	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.

See footnote at end of table.

TABLE 12.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
OP*:											
Onite	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
Pajarito	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Poor	---	Very poor.	Poor.
Pintura	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
OR*:											
Onite	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
Pintura	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Pa	Good	Good	Poor	---	Poor	Poor	Very poor.	Fair	---	Very poor.	Poor.
Pajarito											
Pb*:											
Pajarito	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Poor	---	Very poor.	Poor.
Pintura	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
PN*:											
Pinaleno	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Nolam	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
RE.											
Riverwash											
RF*:											
Riverwash.											
Arizo	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
RG*:											
Rock outcrop.											
Argids.											
RH*:											
Rock outcrop.											
Argids.											
RL*:											
Rock outcrop.											
Lozier	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
RT*:											
Rock outcrop.											
Torriorthents.											

See footnote at end of table.

TABLE 12.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
SH*:											
Simona	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
Harrisburg	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
ST*:											
Stellar	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
Stellar	Poor	Poor	Fair	---	Poor	Poor	Very poor.	Poor	---	Very poor.	Fair.
TE*:											
Tencee	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
Upton	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
TF*:											
Terino	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
Casito	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
Pinaleno	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Vf, Vg Vinton Variant	Good	Good	Fair	---	Fair	Good	Good	Good	---	Good	Fair.
WH*:											
Wink	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
Harrisburg	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Simona	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
WP*:											
Wink	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
Pintura	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--ENGINEERING INDEX PROPERTIES

[The symbol > means more than. Absence of an entry indicates that data were not estimated]

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Ad----------	0-10	Sandy clay loam	SC, CL	A-6	0	100	100	90-100	45-80	25-35	10-15
Adelino	10-28	Loam, sandy clay loam, clay loam.	SC, CL	A-6	0	100	100	90-100	35-75	25-35	10-15
	28-60	Sandy loam, sandy clay loam, loam.	SM, SM-SC	A-2, A-4	0	100	100	90-100	30-40	20-30	NP-10
Ae----------	0-5	Clay loam-------	SC, CL	A-6	0	100	100	90-100	45-80	25-35	10-15
Adelino	5-27	Loam, silty clay loam, clay loam.	SC, CL	A-6	0	100	100	90-100	35-75	25-35	10-15
	27-60	Sandy loam, sandy clay loam, loam.	SM, SM-SC	A-2, A-4	0	100	100	90-100	30-40	20-30	NP-10
AF*:											
Aftaden----------	0-2	Loamy sand------	SM	A-1, A-2	0-35	90-100	85-95	40-70	15-25	---	NP
	2-18	Fine sandy loam, sandy loam, gravelly sandy loam.	SM-SC, SM	A-2, A-4	5-15	75-95	70-95	55-85	30-45	15-25	NP-10
	18	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
Onite----------	0-5	Loamy sand------	SM	A-2	0	100	100	50-95	15-35	---	NP
	5-18	Sandy loam, gravelly sandy loam.	SM	A-2	0	75-100	65-100	50-95	15-35	---	NP
	18-60	Loamy sand, gravelly sandy loam, sandy loam.	SM	A-1, A-2	0	65-100	60-100	45-85	10-35	---	NP
Ag----------	0-12	Loam----------	ML, SM	A-4	0	100	100	70-95	40-70	20-30	NP-5
Agua	12-23	Loam, fine sandy loam, very fine sandy loam.	ML, SM	A-4	0	100	100	70-95	40-70	20-30	NP-5
	23-60	Sand, fine sand	SP, SP-SM, SM	A-3, A-2	0	100	100	60-90	0-15	---	NP
Ah----------	0-12	Clay loam-------	CL	A-6	0	100	100	90-100	70-80	30-40	10-20
Agua	12-24	Loam, fine sandy loam, very fine sandy loam.	ML, SM	A-4	0	100	100	70-95	40-70	20-30	NP-5
	24-60	Sand, fine sand	SP, SP-SM, SM	A-3, A-2	0	100	100	60-90	0-15	---	NP
AJ*----------	0-11	Fine sandy loam	ML, SM	A-4	0	100	100	70-95	40-70	20-30	NP-5
Agua Variant	11-28	Very fine sandy loam, loam.	CL-ML, SM-SC, ML, SM	A-4	0	100	100	75-90	40-70	20-30	NP-10
	28-60	Sand, fine sand	SP, SP-SM, SM	A-3, A-2	0	100	100	60-90	0-15	---	NP

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
AK*:											
Agua Variant------	0-13	Fine sandy loam	ML, SM	A-4	0	100	100	70-95	40-70	20-30	NP-5
	13-23	Very fine sandy loam, loam.	CL-ML, SM-SC, ML, SM	A-4	0	100	100	75-90	40-70	20-30	NP-10
	23-60	Sand, fine sand	SP, SP-SM, SM	A-3, A-2	0	100	100	60-90	0-15	---	NP
Belen Variant-----	0-4	Silty clay------	CH, CL	A-7, A-6	0	100	100	95-100	85-100	30-70	15-40
	4-21	Clay, silty clay	CH, MH	A-7	0	100	100	95-100	90-100	50-70	20-40
	21-38	Fine sandy loam, loam, very fine sandy loam.	CL-ML	A-4	0	100	100	75-95	50-75	20-30	5-10
	38-60	Very fine sand	SM, ML	A-4	0	100	100	75-90	35-55	---	NP
AL*:											
Akela----------	0-3	Gravelly sandy loam.	SM, GM	A-2, A-4, A-1	5-10	50-75	50-75	30-60	15-25	20-25	NP-5
	3-14	Very gravelly sandy loam, very gravelly loam.	SP-SM, GP-GM, SM, GM	A-1	5-10	40-60	30-50	20-40	5-15	15-20	NP-5
	14	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
Akela----------	0-3	Gravelly sandy loam.	SM, GM	A-2, A-4, A-1	5-10	50-75	50-75	30-60	15-25	20-25	NP-5
	3-14	Very gravelly sandy loam, very gravelly loam.	SP-SM, GP-GM, SM, GM	A-1	5-10	40-60	30-50	20-40	5-15	15-20	NP-5
	14	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
AM*:											
Aladdin----------	0-2	Gravelly sandy loam.	SM	A-2, A-1	0-5	70-90	50-75	25-50	15-30	15-25	NP-5
	2-68	Gravelly sandy loam, gravelly fine sandy loam, gravelly loam.	SM, SM-SC, ML, CL-ML	A-1, A-2, A-4	0-5	70-90	50-75	25-65	15-55	20-30	NP-10
Coxwell----------	0-3	Gravelly sandy loam.	SM-SC, SM	A-4, A-2	0-15	75-85	70-85	45-60	25-35	15-30	NP-10
	3-13	Gravelly sandy clay loam, gravelly clay loam.	SC, CL, SM-SC, CL-ML	A-6, A-2	0-15	60-75	60-75	60-75	30-55	25-40	5-20
	13-33	Very gravelly sandy clay loam, very gravelly clay loam.	GC, GP-GC	A-2	0	25-50	10-40	10-35	5-20	25-35	5-15
	33	Weathered bedrock.	---	---	---	---	---	---	---	---	---
An----------	0-16	Silt loam-------	CL	A-6,	0	100	100	90-100	60-85	25-35	10-15
Anapra	16-28	Silty clay loam, clay loam.	CL	A-6	0	100	100	85-100	75-90	25-35	10-15
	28-60	Fine sand, loamy fine sand.	SM, SM-SC	A-2, A-4	0	100	95-100	65-80	10-40	15-25	NP-10

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Ao---------- Anapra	0-28 28-60	Clay loam------- Fine sand, loamy fine sand.	CL SM, SM-SC	A-6, A-7 A-2, A-4	0 0	100 100	100 95-100	90-100 65-80	60-85 10-40	30-50 <25	12-30 NP-7
Ap*: Anthony----------	0-18 18-38 38-60	Fine sandy loam Fine sandy loam, sandy loam. Loamy very fine sand.	SM, ML SM SM	A-4 A-2, A-4 A-4	0 0 0	95-100 95-100 95-100	90-100 90-100 90-100	55-85 50-85 50-85	35-65 30-50 35-50	20-30 20-30 20-30	NP-5 NP-5 NP-5
Vinton---------- 	0-12 12-60	Fine sandy loam Loamy sand, loamy fine sand, fine sandy loam.	SM, ML SM	A-4 A-2	0 0	100 95-100	100 90-100	70-85 55-80	40-55 15-30	20-30 ---	NP-5 NP
Ar*: Anthony----------	0-13 13-60	Loam---------- Fine sandy loam, sandy loam, loamy very fine sand.	CL-ML, CL SM	A-4, A-6 A-2, A-4	0 0	100 95-100	100 90-100	85-100 50-85	60-80 30-50	25-35 20-30	5-15 NP-5
Vinton---------- 	0-16 16-60	Loam---------- Loamy sand, loamy fine sand, fine sand, loam.	CL-ML, CL SM	A-4, A-6 A-2	0 0	100 95-100	100 90-100	85-100 55-80	60-80 15-30	25-35 ---	5-15 NP
As*: Anthony----------	0-15 15-60	Clay loam------- Fine sandy loam, sandy loam, loamy very fine sand.	CL-ML, CL SM	A-4, A-6 A-2, A-4	0 0	100 95-100	100 90-100	85-100 50-85	60-80 30-50	25-35 20-30	5-15 NP-5
Vinton---------- 	0-15 15-60	Clay loam------- Loamy sand, loamy fine sand, fine sand.	CL-ML, CL SM	A-4, A-6 A-2	0 0	100 95-100	100 90-100	85-100 55-80	60-80 15-30	25-35 ---	5-15 NP
At---------- Armijo	0-10 10-52 52-60	Loam---------- Clay loam, clay, silty clay. Stratified very fine sandy loam to loamy fine sand.	CL, CL-ML CH SM	A-4, A-6 A-7 A-2, A-4	0 0 0	100 100 100	100 100 100	95-100 95-100 60-85	75-85 50-100 25-50	20-30 50-75 ---	5-15 25-50 NP-5
Aw---------- Armijo	0-15 15-42 42-60	Clay loam------- Sandy clay, clay, silty clay. Stratified very fine sandy loam to loamy fine sand.	CL, CL-ML CH SM	A-4, A-6 A-7 A-2, A-4	0 0 0	100 100 100	100 100 100	95-100 95-100 60-85	75-85 50-100 25-50	20-30 50-75 ---	5-15 25-50 NP-5

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Ax	0-12	Clay	CL, CH	A-7	0	100	100	95-100	85-95	45-70	25-45
Armijo	12-60	Sandy clay, clay, silty clay.	CH	A-7	0	100	100	95-100	50-100	50-75	25-50
	60-70	Stratified very fine sandy loam to loamy fine sand.	SM	A-2, A-4	0	100	100	60-85	25-50	---	NP-5
Be	0-12	Loam	CL, CL-ML	A-4, A-6	0	100	100	95-100	75-95	20-30	5-15
Belen	12-24	Clay, silty clay, silty clay loam.	CH, MH	A-7	0	100	100	95-100	90-100	50-70	20-40
	24-60	Fine sandy loam, loam, silt loam.	CL, ML	A-4	0	100	100	75-95	50-85	20-30	5-10
Bf	0-11	Clay loam	CL	A-6	0	100	100	95-100	85-95	30-40	15-25
Belen	11-26	Clay, silty clay, silty clay loam.	CH, MH	A-7	0	100	100	95-100	90-100	50-70	20-40
	26-60	Loam, silt loam, very fine sandy loam.	CL, ML	A-4	0	100	100	75-95	50-85	20-30	5-10
Bg	0-11	Clay	CH, MH	A-7	0	100	100	95-100	90-100	50-70	20-40
Belen	11-30	Clay, silty clay, silty clay loam.	CH, MH	A-7	0	100	100	95-100	90-100	50-70	20-40
	30-60	Fine sandy loam, loam, silt loam.	CL, ML	A-4	0	100	100	75-95	50-85	20-30	5-10
BH*	0-4	Silty clay	CH, CL	A-7, A-6	0	100	100	95-100	85-100	30-70	15-40
Belen Variant	4-21	Clay, silty clay	CH, MH	A-7	0	100	100	95-100	90-100	50-70	20-40
	21-38	Fine sandy loam, loam, very fine sandy loam.	CL-ML	A-4	0	100	100	75-95	50-75	20-30	5-10
	38-60	Very fine sand	SM, ML	A-4	0	100	100	75-90	35-55	---	NP
BJ*:											
Berino	0-4	Loamy fine sand	SM, SP-SM	A-2	0	95-100	95-100	50-95	10-35	---	NP
	4-60	Sandy clay loam, sandy loam.	SC, SM-SC, CL, CL-ML	A-6, A-4	0	95-100	95-100	65-80	35-55	20-35	5-15
Bucklebar	0-6	Sandy loam	SM, ML	A-2, A-4	0	95-100	95-100	60-85	30-55	15-25	NP-5
	6-25	Sandy clay loam, clay loam.	SM-SC, SC, CL-ML, CL	A-6, A-4	0-5	90-100	90-100	60-85	40-60	25-35	5-15
	25-38	Loam	ML, CL-ML	A-4	0-5	95-100	95-100	80-100	60-80	25-35	5-10
	38-60	Silty clay loam, loam.	CL-ML, CL	A-4, A-6	0-5	95-100	95-100	85-100	60-90	25-40	5-15
Dona Ana	0-5	Fine sandy loam	SM	A-2, A-4	0	95-100	90-100	60-85	30-50	15-25	NP-5
	5-60	Sandy clay loam, sandy loam, loam.	SC, SM-SC	A-6, A-4	0	95-100	90-100	80-90	35-50	25-40	5-15
BK*:											
Berino	0-5	Fine sandy loam	SM	A-2, A-4	0	95-100	95-100	60-95	30-50	---	NP
	5-60	Sandy clay loam, sandy loam.	SC, SM-SC, CL, CL-ML	A-6, A-4	0	95-100	95-100	65-80	35-55	20-35	5-15

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
BK*:											
Dona Ana	0-6	Fine sandy loam	SM	A-2, A-4	0	95-100	90-100	60-85	30-50	15-25	NP-5
	6-60	Sandy clay loam, sandy loam, loam.	SC, SM-SC	A-6, A-4	0	95-100	90-100	80-90	35-50	25-40	5-15
BL*:											
Berino	0-8	Fine sandy loam	SM	A-2, A-4	0	95-100	95-100	60-95	30-50	---	NP
	8-60	Sandy clay loam, sandy loam.	SC, SM-SC, CL, CL-ML	A-6, A-4	0	95-100	95-100	65-80	35-55	20-35	5-15
Pintura	0-60	Loamy fine sand	SP-SM, SM	A-3, A-2	0	100	100	70-95	5-25	---	NP
Bm	0-12	Loamy sand	SM	A-2	0	90-100	90-100	75-85	20-35	---	NP
Bluepoint	12-60	Stratified loamy fine sand to loamy sand.	SM	A-2	0	90-100	90-100	70-80	15-25	---	NP
Bn	0-18	Loamy sand	SM	A-2	0	90-100	90-100	75-85	20-35	---	NP
Bluepoint	18-60	Stratified loamy fine sand to loamy sand.	SM	A-2	0	90-100	90-100	70-80	15-25	---	NP
BO	0-17	Loamy sand	SM	A-2	0	90-100	90-100	75-85	20-35	---	NP
Bluepoint	17-60	Stratified loamy fine sand to loamy sand.	SM	A-2	0	90-100	90-100	70-80	15-25	---	NP
BP*:											
Bluepoint	0-19	Loamy sand	SM	A-2	0	90-100	90-100	75-85	20-35	---	NP
	19-60	Stratified loamy fine sand to loamy sand.	SM	A-2	0	90-100	90-100	70-80	15-25	---	NP
Caliza	0-22	Very gravelly sandy loam.	GP-GM, GM	A-1	0	30-50	25-45	15-35	5-20	20-30	NP-5
	22-60	Very gravelly loamy sand, very gravelly sand.	GP, GP-GM	A-1	0	25-50	20-40	10-30	0-10	---	NP
Yturbide	0-15	Loamy sand	SM	A-1, A-2	0	80-95	75-90	40-70	15-30	---	NP
	15-26	Gravelly loamy sand.	SM, SP-SM	A-1, A-2	0	65-80	60-75	35-55	10-20	---	NP
	26-60	Gravelly sand, gravelly loamy sand, loamy sand.	SP-SM	A-1, A-2, A-3	0-5	60-80	55-75	30-60	5-10	---	NP
Br	0-5	Loamy fine sand	SM	A-2	0	95-100	95-100	70-85	15-30	---	NP
Brazito	5-60	Fine sand, sand	SP, SP-SM	A-3	0	95-100	95-100	65-85	0-10	---	NP
Bs	0-15	Very fine sandy loam.	ML, SM, CL-ML, SM-SC	A-4	0	95-100	95-100	75-90	35-55	20-30	NP-10
Brazito	15-60	Fine sand, sand	SP, SP-SM	A-3	0	95-100	95-100	65-85	0-10	---	NP
CA*:											
Cacique	0-2	Loamy sand	SM	A-2	0	100	100	50-80	15-35	---	NP
	2-25	Sandy clay loam, sandy loam.	SC	A-2, A-6	0	90-100	85-100	65-90	30-50	25-35	10-15
	25	Indurated	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
CA*:											
Cruces	0-2	Loamy sand	SM	A-2	0	90-100	90-100	70-90	15-35	---	NP
	2-14	Fine sandy loam, sandy clay loam.	CL-ML, SM-SC, SC, CL	A-2, A-4	0	90-100	80-100	80-90	30-60	20-30	5-10
	14	Indurated	---	---	---	---	---	---	---	---	---
Simona	0-7	Loamy sand	SM	A-2	0	100	100	90-100	15-35	---	NP
	7-18	Fine sandy loam, sandy loam, gravelly fine sandy loam.	SM	A-2, A-4	0-5	70-100	65-100	50-100	20-50	---	NP
	18	Indurated	---	---	---	---	---	---	---	---	---
Cb*:											
Canutio	0-10	Gravelly sandy loam.	SM-SC, SC	A-1, A-2	5-25	60-75	60-70	30-40	10-30	20-40	5-20
	10-60	Very gravelly sandy loam, very gravelly loamy sand, gravelly loamy sand.	GP-GC, SC, GC, SP-SC	A-2	10-20	45-75	45-70	25-40	5-20	20-40	5-20
Arizo	0-15	Gravelly sandy loam.	GM	A-1, A-2	0-15	50-60	50-60	30-55	15-35	---	NP
	15-60	Stratified very gravelly sand to loamy sand.	GP-GM, GP	A-1	0-15	25-55	20-50	10-30	0-10	---	NP
CH*:											
Cave	0-16	Gravelly sandy loam.	SM-SC	A-2, A-4	0-5	70-90	60-75	40-65	25-50	25-30	5-10
	16	Indurated	---	---	---	---	---	---	---	---	---
Harrisburg	0-3	Fine sandy loam	SM	A-4	0	95-100	90-100	70-85	40-50	20-30	NP-5
	3-24	Fine sandy loam, gravelly fine sandy loam.	SM	A-2, A-4	0	60-90	60-90	40-70	15-45	20-30	NP-5
	24	Indurated	---	---	---	---	---	---	---	---	---
DR*:											
Dona Ana	0-5	Fine sandy loam	SM	A-2, A-4	0	95-100	90-100	60-85	30-50	15-25	NP-5
	5-60	Sandy clay loam, sandy loam, loam.	SC, SM-SC	A-6, A-4	0	95-100	90-100	80-90	35-50	25-40	5-15
Reagan	0-23	Clay loam	CL	A-6, A-7	0	95-100	95-100	90-100	70-95	35-45	20-30
	23-71	Silty clay, silty clay loam, loam.	CL	A-6, A-7	0	95-100	95-100	85-100	65-95	35-50	20-30
DS. Dumps											
Ge	0-8	Loam	SM, ML	A-4	0	95-100	95-100	75-85	40-60	20-30	NP-5
Glendale	8-60	Clay loam, silty clay loam, very fine sandy loam.	CL	A-6	0	100	100	95-100	75-90	30-40	15-25
Gf	0-8	Clay loam	CL	A-6	0	100	100	95-100	75-90	30-40	15-25
Glendale	8-60	Clay loam, silty clay loam, very fine sandy loam.	CL	A-6	0	100	100	95-100	75-90	30-40	15-25

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Gg	0-12	Clay loam	CL	A-6	0	100	100	80-95	75-90	30-40	15-25
Glendale	12-60	Clay loam, silty clay loam.	CL	A-6	0	100	100	80-95	75-90	30-40	15-25
HD*.											
Haplargids											
Hf	0-13	Fine sandy loam	SM	A-4	0	100	100	60-70	35-50	---	NP
Harkey	13-56	Very fine sandy loam, loam, silt loam.	ML	A-4	0	100	100	85-100	75-90	20-30	NP-5
	56-60	Fine sand	SP-SM, SM	A-3, A-4	0	100	100	70-95	5-25	---	NP
Hg	0-18	Loam	ML	A-4	0	100	100	90-100	65-90	20-30	NP-5
Harkey	18-60	Very fine sandy loam, loam, silt loam.	ML	A-4	0	100	100	85-100	75-90	20-30	NP-5
Hh	0-10	Loam	ML	A-4	0	100	100	90-100	65-90	20-30	NP-5
Harkey	10-47	Very fine sandy loam, loam, silt loam.	CL-ML, ML, CL	A-4	0	100	100	85-100	75-90	20-30	NP-10
	47-60	Loamy sand	SM	A-1, A-2	0	85-100	75-100	45-80	10-30	---	NP
Hk	0-12	Clay loam	CL	A-6	0	100	100	85-100	70-80	30-40	10-20
Harkey	12-60	Fine sandy loam, loam, silt loam.	ML	A-4	0	100	100	85-100	75-90	20-30	NP-5
MN*:											
Masonfort	0-3	Sandy loam	SM	A-2, A-4	0-5	85-100	80-100	50-70	25-40	20-30	NP-5
	3-18	Sandy loam, gravelly sandy loam.	SM, GM	A-1, A-2	0-10	60-100	55-95	35-65	15-35	20-30	NP-5
	18	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Nickel	0-8	Gravelly sandy loam.	GM, SM	A-1, A-2	0-5	55-80	50-75	30-70	10-30	---	NP
	8-60	Very gravelly sandy loam, very gravelly fine sandy loam, gravelly sandy loam.	GP-GM, GM, SP-SM, SM	A-1	0-10	30-60	20-55	15-35	5-15	---	NP
Mo	0-10	Silty clay loam	CL	A-6, A-7	0	100	100	90-100	75-95	25-45	10-25
Mimbres	10-60	Silty clay loam, silt loam, clay loam.	CL	A-6, A-7	0	100	100	90-100	75-95	25-45	10-25
MR*:											
Minlith	0-3	Loamy sand	SM, SP-SM	A-1, A-2	0-5	85-100	75-100	45-80	10-30	---	NP
	3-13	Very gravelly loamy sand, very gravelly loamy fine sand.	GP-GM, GM, SP-SM, SM	A-1	5-25	45-60	40-50	20-40	5-15	---	NP
	13	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
MR*:											
Onite	0-5	Loamy sand	SM	A-2	0	100	100	50-95	15-35	---	NP
	5-27	Sandy loam, gravelly sandy loam.	SM	A-2	0	75-100	65-100	50-95	15-35	---	NP
	27-60	Loamy sand, gravelly sandy loam, sandy loam.	SM	A-1, A-2	0	65-100	60-100	45-85	10-35	---	NP
MS*:											
Motoqua	0-2	Cobbly loam	GM-GC, GC	A-4, A-6	25-30	65-85	60-75	50-65	35-50	20-35	5-15
	2-20	Very cobbly silt loam, very cobbly loam.	GM-GC, GC	A-4, A-6	25-45	55-65	55-65	50-55	35-40	20-35	5-15
	20	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
NB*:											
Nickel	0-2	Very gravelly sandy loam.	GP-GM, GM,	A-1, A-2	0-5	25-55	20-50	15-45	5-35	---	NP
	2-60	Very gravelly sandy loam, very gravelly fine sandy loam, gravelly sandy loam.	GP-GM, GM, SP-SM, SM	A-1	0-10	30-60	20-55	15-35	5-15	---	NP
Badland.											
NU*:											
Nickel	0-5	Very gravelly fine sandy loam.	GM, GP-GM	A-1, A-2	0-5	25-55	20-50	15-45	5-35	---	NP
	5-60	Very gravelly sandy loam, very gravelly fine sandy loam, gravelly sandy loam.	GP-GM, GM, SP-SM, SM	A-1	0-10	30-60	20-55	15-35	5-15	---	NP
Upton	0-14	Gravelly sandy loam.	CL, GC, SC	A-4, A-6	0-5	65-85	60-75	51-70	35-55	25-38	10-15
	14-22	Cemented	---	---	0-50	---	---	---	---	---	---
	22-60	Variable	---	---	0-20	---	---	---	---	---	---
OP*:											
Onite	0-5	Loamy sand	SM	A-2	0	100	100	50-95	15-35	---	NP
	5-18	Sandy loam, gravelly sandy loam.	SM	A-2	0	75-100	65-100	50-95	15-35	---	NP
	18-60	Loamy sand, gravelly sandy loam, sandy loam.	SM	A-1, A-2	0	65-100	60-100	45-85	10-35	---	NP
Pajarito	0-8	Fine sandy loam	SM, SM-SC	A-2, A-4	0	100	100	85-100	30-45	10-20	NP-5
	8-25	Fine sandy loam, sandy loam.	SM, SM-SC	A-2, A-4	0	90-100	85-100	60-100	25-45	10-20	NP-5
	25-60	Fine sandy loam, sandy loam, loam, fine sand.	SM, ML	A-4, A-2	0	90-100	85-100	60-95	20-55	20-30	NP-5

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
)P*:											
Pintura	0-60	Fine sand	SP-SM, SM	A-3, A-2	0	100	100	70-95	5-25	---	NP
)R*:											
Onite	0-5	Loamy fine sand	SM	A-2	0	100	100	50-95	15-35	---	NP
	5-20	Sandy loam, gravelly sandy loam.	SM	A-2	0	75-100	65-100	50-95	15-35	---	NP
	20-60	Loamy sand, gravelly sandy loam, sandy loam.	SM	A-1, A-2	0	65-100	60-100	45-85	10-35	---	NP
Pintura	0-60	Fine sand	SP-SM, SM	A-3, A-2	0	100	100	70-95	5-25	---	NP
?a	0-12	Fine sandy loam	SM, SM-SC	A-2, A-4	0	100	100	85-100	30-45	10-20	NP-5
Pajarito	12-20	Fine sandy loam, sandy loam.	SM, SM-SC	A-2, A-4	0	90-100	85-100	60-100	25-45	10-20	NP-5
	20-60	Fine sandy loam, sandy loam, loam.	SM, ML	A-4, A-2	0	90-100	85-100	60-95	20-55	20-30	NP-5
?b*:											
Pajarito	0-14	Loamy fine sand	SM	A-2	0	100	100	85-100	25-35	---	NP
	14-28	Fine sandy loam, sandy loam.	SM, SM-SC	A-2, A-4	0	90-100	85-100	60-100	25-45	10-20	NP-5
	28-60	Fine sandy loam, sandy loam, loamy very fine sand.	SM, ML	A-4, A-2	0	90-100	85-100	60-95	20-55	20-30	NP-5
Pintura	0-10	Loamy fine sand	SP-SM, SM	A-3, A-2	0	100	100	70-95	5-25	---	NP
	10-60	Fine sand	SP-SM, SM	A-3, A-2	0	100	100	70-75	5-25	---	NP
?N*:											
Pinaleno	0-2	Very gravelly sandy loam.	GM	A-1	0-15	30-55	25-50	15-35	10-20	20-30	NP-5
	2-20	Very gravelly sandy loam, very gravelly sandy clay loam.	GM-GC	A-2	0-20	30-55	25-50	15-45	10-25	25-30	5-10
	20-37	Very gravelly sandy loam.	GM	A-1	0-20	30-55	25-50	15-35	10-20	20-30	NP-5
	37-60	Very gravelly loamy sand.	GP-GM, GM	A-1	0-20	30-55	25-50	15-35	5-15	---	NP
Nolam	0-2	Very gravelly fine sandy loam.	GM	A-1, A-2	0	35-50	35-50	25-40	15-30	---	NP
	2-17	Very gravelly sandy clay loam, very gravelly sandy loam.	GM-GC, GC, GP-GC	A-2	0	35-50	35-50	25-45	10-25	25-40	5-15
	17-40	Very gravelly sandy loam.	GM, GP-GM	A-1	0	35-50	35-50	20-35	10-20	---	NP
	40-71	Very gravelly sand, very gravelly loamy sand.	GM, GP-GM	A-1	0	35-50	35-50	20-35	5-15	---	NP
?E.											
Riverwash											

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
RF*:											
Riverwash.											
Arizo	0-12	Gravelly loamy sand.	GM	A-1	0-15	50-75	50-75	20-45	15-25	---	NP
	12-60	Stratified very gravelly sand to very gravelly loamy sand.	GP-GM, GP	A-1	0-15	25-55	20-50	10-30	0-10	---	NP
RG*:											
Rock outcrop.											
Argids.											
RH*:											
Rock outcrop.											
Argids.											
RL*:											
Rock outcrop.											
Lozier	0-6	Stony loam	GC, SC, CL	A-2, A-4, A-6	5-20	40-80	30-70	25-65	20-60	25-35	10-15
	6-11	Very stony loam	GC	A-2, A-4	35-70	35-65	30-60	30-50	20-40	25-35	10-15
	11	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
RT*:											
Rock outcrop.											
Torriorthents.											
SH*:											
Simona	0-2	Sandy loam	SM	A-4	0	100	100	90-100	35-50	---	NP
	2-12	Fine sandy loam, sandy loam, gravelly fine sandy loam.	SM	A-2, A-4	0-5	70-100	65-100	50-100	20-50	---	NP
	12	Indurated	---	---	---	---	---	---	---	---	---
Harrisburg	0-8	Fine sandy loam	SM	A-4	0	95-100	90-100	70-85	40-50	20-30	NP-5
	8-24	Fine sandy loam, sandy loam.	SM	A-2, A-4	0	95-100	90-100	55-85	30-50	20-30	NP-5
	24	Indurated	---	---	---	---	---	---	---	---	---
ST*:											
Stellar	0-3	Clay loam	CL	A-6	0	100	100	90-100	70-95	30-40	10-20
	3-28	Clay, sandy clay, clay loam.	CH, CL, SC	A-7	0	100	100	80-95	45-90	40-60	15-30
	28-60	Clay loam, sandy clay loam, gravelly clay loam.	CL, GC, SC	A-6, A-7	0-5	65-100	60-100	55-100	45-70	30-50	10-25
Stellar, flooded	0-5	Clay loam	CL	A-6	0	100	100	95-100	70-80	30-40	10-20
	5-31	Clay	CL, CH	A-7	0	100	100	90-100	70-90	40-55	15-30
	31-60	Sandy clay loam, clay loam.	SM-SC, SC, CL-ML, CL	A-4, A-6	0	95-100	90-100	80-95	40-75	25-40	5-15

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
TE*:											
Tencee	0-7	Very gravelly sandy loam.	GM, GP-GM	A-1	0-25	35-50	25-45	15-40	5-20	20-30	NP-5
	7	Indurated	---	---	---	---	---	---	---	---	---
Upton	0-16	Gravelly sandy loam.	CL, GC, SC	A-4, A-6	0-2	65-85	60-75	51-70	35-55	25-35	10-15
	16-22	Cemented	---	---	0-50	---	---	---	---	---	---
	22-60	Variable	---	---	0-20	---	---	---	---	---	---
TF*:											
Terino	0-2	Very gravelly sandy loam.	GP-GM, GM, SM, SP-SM	A-1, A-2, A-3	0-5	35-60	25-50	15-45	5-30	---	NP
	2-15	Very gravelly sandy clay loam, very gravelly sandy loam.	GM-GC, GM, GC, GP-GM	A-1, A-2	0-5	35-55	25-50	20-45	10-30	20-30	NP-10
	15-32	Indurated	---	---	---	---	---	---	---	---	---
	32-60	Very gravelly sandy loam, very gravelly loamy sand.	GP-GM, GM	A-1	0-10	35-55	25-50	15-40	5-20	---	NP
Casito	0-6	Very gravelly sandy loam.	GM, GP-GM	A-1	0-5	35-50	30-50	15-35	10-25	---	NP
	6-12	Very gravelly sandy clay loam.	GM-GC, GC, GP-GC	A-1, A-2	0-5	30-50	25-50	20-45	10-30	20-30	5-15
	12-28	Indurated	---	---	---	---	---	---	---	---	---
	28-60	Very gravelly sandy loam, very gravelly loamy sand.	GM, GP-GM	A-1	0-5	35-50	30-50	15-40	5-20	---	NP
Pinaleno	0-2	Very gravelly sandy loam.	GM	A-1	0-15	30-55	25-50	15-35	10-20	20-30	NP-5
	2-30	Very gravelly sandy loam, very gravelly sandy clay loam.	GM-GC	A-2	0-20	30-55	25-50	15-45	10-25	25-30	5-10
	30-40	Very gravelly sandy loam.	GM	A-1	0-20	30-55	25-50	15-35	10-20	20-30	NP-5
	40-60	Very gravelly loamy sand.	GP-GM, GM	A-1	0-20	30-55	25-50	15-35	5-15	---	NP
Vf Vinton Variant	0-14	Fine sandy loam	SM, ML	A-4	0	100	100	70-90	40-65	15-25	NP-5
	14-32	Loamy sand, loamy fine sand, fine sand.	SM	A-2	0	100	100	50-85	15-35	---	NP
	32-42	Clay loam, silty clay loam.	CL	A-6, A-7	0	100	100	90-100	70-95	35-45	15-25
	42-60	Sand	SP, SP-SM, SM	A-2, A-3	0	100	100	60-80	0-15	---	NP
Vg Vinton Variant	0-16	Sandy clay loam	SC, CL	A-6	0	100	100	80-95	35-75	30-40	10-15
	16-33	Loamy sand, loamy fine sand, fine sand.	SM	A-2	0	100	100	50-85	15-35	<20	NP
	33-60	Clay loam, silty clay loam.	CL	A-6, A-7	0	100	100	90-100	70-95	35-45	15-25

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
WH*:											
Wink	0-2	Fine sandy loam	SM,	A-2	0-5	90-100	90-100	80-100	15-35	15-25	NP-5
	2-26	Fine sandy loam, loam.	SM, SM-SC	A-2 A-4	0-5	90-100	90-100	80-100	25-45	15-25	NP-10
	26-60	Sandy loam	SM-ML	A-2, A-4	0	95-100	95-100	60-85	30-55	15-25	NP-5
Harrisburg	0-4	Loamy fine sand	SM	A-2	0	95-100	90-100	75-85	25-35	---	NP
	4-24	Fine sandy loam, sandy loam.	SM	A-2, A-4	0	95-100	90-100	55-85	30-50	20-30	NP-5
	24	Indurated	---	---	---	---	---	---	---	---	---
Simona	0-2	Sandy loam	SM	A-4	0	100	100	90-100	35-50	---	NP
	2-7	Fine sandy loam, sandy loam, gravelly fine sandy loam.	SM	A-2, A-4	0-5	70-100	65-100	50-100	20-50	---	NP
	7	Indurated	---	---	---	---	---	---	---	---	---
WP*:											
Wink	0-10	Loamy fine sand	SM, SM-SC	A-2	0-5	90-100	90-100	80-100	15-35	15-25	NP-5
	10-20	Fine sandy loam, loam.	SM, SM-SC	A-4	0-5	90-100	90-100	80-100	25-45	15-25	NP-10
	20-60	Sandy loam, loamy fine sand	SM	A-2, A-4	0	90-100	90-100	55-85	25-50	15-30	NP-5
Pintura	0-60	Loamy fine sand	SP-SM, SM	A-3, A-2	0	100	100	70-95	5-25	---	NP

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated]

Soil name and map symbol	Depth	Clay <2mm	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group
								K	T	
	In	Pct	In/hr	In/in	pH	Mmhos/cm				
Ad	0-10	20-35	0.2-2.0	0.15-0.20	7.9-8.4	<2	Moderate	0.28	5	4L
Adelino	10-28	20-35	0.6-2.0	0.14-0.18	7.9-9.0	<2	Moderate	0.43		
	28-60	15-25	0.6-6.0	0.11-0.16	7.9-9.0	<2	Low	0.43		
Ae	0-5	20-35	0.2-2.0	0.15-0.20	7.9-8.4	<2	Moderate	0.28	5	4L
Adelino	5-27	20-35	0.6-2.0	0.14-0.18	7.9-9.0	<2	Moderate	0.43		
	27-60	15-25	0.6-6.0	0.11-0.16	7.9-9.0	<2	Low	0.43		
AF*:										
Aftaden	0-2	4-14	6.0-20	0.06-0.08	6.6-7.3	<2	Low	0.17	1	2
	2-18	8-18	2.0-6.0	0.08-0.13	6.6-7.8	<2	Low	0.24		
	18	---	---	---	---	---	---	---		
Rock outcrop.										
Onite	0-5	5-10	6.0-20	0.06-0.10	7.4-7.8	<2	Low	0.17	5	2
	5-18	10-15	2.0-6.0	0.07-0.12	7.4-8.4	<2	Low	0.24		
	18-60	5-15	2.0-20	0.06-0.12	7.9-8.4	<2	Low	0.24		
Ag	0-12	10-15	0.6-2.0	0.13-0.17	7.4-8.4	2-4	Low	0.49	3	3
Agua	12-23	6-15	0.6-2.0	0.13-0.17	7.4-8.4	2-4	Low	0.49		
	23-60	0-5	6.0-20	0.05-0.07	7.4-8.4	<2	Low	0.10		
Ah	0-12	28-32	0.2-0.6	0.15-0.19	7.4-8.4	2-4	Moderate	0.32	3	4L
Agua	12-24	10-15	0.6-2.0	0.13-0.17	7.4-8.4	2-4	Low	0.49		
	24-60	0-5	6.0-20	0.05-0.07	7.4-8.4	<2	Low	0.10		
AJ*	0-11	8-18	0.6-2.0	0.07-0.13	7.9-9.0	>4	Low	0.49	3	3
Agua Variant	11-28	8-18	0.6-2.0	0.11-0.17	7.9-9.0	>4	Low	0.49		
	28-60	0-10	6.0-20	0.02-0.04	7.9-9.0	>4	Low	0.10		
AK*:										
Agua Variant	0-13	8-18	0.6-2.0	0.07-0.13	7.9-9.0	>4	Low	0.49	3	3
	13-23	8-18	0.6-2.0	0.11-0.17	7.9-9.0	>4	Low	0.49		
	23-60	0-10	6.0-20	0.02-0.04	7.9-9.0	>4	Low	0.10		
Belen Variant	0-4	28-50	0.06-0.2	0.08-0.12	7.9-9.0	>4	High	0.37	5	4L
	4-21	40-50	<0.06	0.08-0.10	7.9-9.0	>4	High	0.37		
	21-38	8-18	0.6-2.0	0.08-0.10	7.9-9.0	>4	Low	0.43		
	38-60	0-10	2.0-6.0	0.07-0.09	7.9-9.0	>4	Low	0.37		
AL*:										
Akela	0-3	10-20	0.6-2.0	0.05-0.10	7.4-8.4	<2	Low	0.17	1	---
	3-14	10-20	0.6-2.0	0.05-0.10	7.4-8.4	<2	Low	0.17		
	14	---	---	---	---	---	---	---		
Rock outcrop.										
Akela	0-3	10-20	0.6-2.0	0.05-0.10	7.4-8.4	<2	Low	0.17	1	---
	3-14	10-20	0.6-2.0	0.05-0.10	7.4-8.4	<2	Low	0.17		
	14	---	---	---	---	---	---	---		
AM*:										
Aladdin	0-2	5-18	2.0-6.0	0.07-0.12	6.6-7.8	<2	Low	0.24	5	5
	2-68	5-18	2.0-6.0	0.07-0.17	6.6-7.8	<2	Low	0.24		
Coxwell	0-3	10-25	0.2-0.6	0.08-0.12	6.6-7.8	<2	Low	0.20	2	3
	3-13	25-35	0.2-0.6	0.07-0.09	6.6-7.8	<2	Moderate	0.28		
	13-33	20-35	0.6-2.0	0.07-0.09	6.6-7.8	<2	Low	0.20		
	33	---	---	---	---	---	---	---		
An, Ao	0-16	15-20	0.2-0.6	0.15-0.22	7.9-8.4	2-4	Moderate	0.43	5	---
Anapra	16-28	28-35	0.2-0.6	0.15-0.22	7.9-8.4	2-4	Moderate	0.43		
	28-60	3-7	6.0-20	0.03-0.08	7.9-8.4	2-8	Low	0.17		

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay <2mm	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group
								K	T	
	In	Pct	In/hr	In/in	pH	Mmhos/cm				
Ap*:										
Anthony	0-18	5-20	2.0-6.0	0.11-0.14	7.9-8.4	<4	Low	0.24	5	3
	18-38	5-18	2.0-6.0	0.10-0.13	7.9-8.4	<4	Low	0.20		
	38-60	0-15	2.0-6.0	0.05-0.08	7.9-8.4	<4	Low	0.17		
Vinton	0-12	5-20	2.0-6.0	0.13-0.15	7.4-8.4	<2	Low	0.28	5	3
	12-60	0-10	2.0-6.0	0.06-0.10	7.9-8.4	<2	Low	0.17		
Ar*:										
Anthony	0-13	15-30	0.6-2.0	0.16-0.20	7.9-8.4	<4	Moderate	0.37	5	4L
	13-60	5-18	2.0-6.0	0.10-0.13	7.9-9.0	<4	Low	0.20		
Vinton	0-16	15-30	0.6-2.0	0.16-0.21	7.4-8.4	<2	Moderate	0.37	5	4L
	16-60	0-10	2.0-6.0	0.06-0.10	7.9-8.4	<2	Low	0.17		
As*:										
Anthony	0-15	15-30	0.6-2.0	0.16-0.20	7.9-8.4	<4	Moderate	0.37	5	4L
	15-60	5-18	2.0-6.0	0.10-0.13	7.9-9.0	<4	Low	0.20		
Vinton	0-15	15-30	0.6-2.0	0.16-0.21	7.4-8.4	<2	Moderate	0.37	5	4L
	15-60	0-10	2.0-6.0	0.06-0.10	7.9-8.4	<2	Low	0.17		
At	0-10	20-35	0.6-2.0	0.12-0.18	7.9-9.0	2-4	Moderate	0.32	5	4L
Armijo	10-52	35-50	<0.06	0.10-0.16	7.9-9.0	2-4	High	0.37		
	52-60	5-12	0.6-2.0	0.10-0.15	7.9-9.0	2-4	Low	0.37		
Aw	0-15	20-35	0.6-2.0	0.12-0.18	7.9-9.0	2-4	Moderate	0.32	5	4L
Armijo	15-42	35-50	<0.06	0.10-0.16	7.9-9.0	2-4	High	0.37		
	42-60	5-12	0.6-2.0	0.10-0.15	7.9-9.0	2-4	Low	0.37		
Ax	0-12	40-50	0.06-0.2	0.13-0.17	7.9-9.0	2-4	High	0.37	5	5
Armijo	12-60	35-50	<0.06	0.10-0.16	7.9-9.0	2-4	High	0.37		
	60-70	5-12	0.6-2.0	0.10-0.15	7.9-9.0	2-4	Low	0.37		
Be	0-12	18-28	0.2-0.6	0.18-0.20	7.9-9.0	<4	Moderate	0.37	5	4L
Belen	12-24	40-50	0.06-0.2	0.14-0.16	7.9-9.0	<4	High	0.37		
	24-60	10-20	0.6-2.0	0.13-0.15	7.9-9.0	<4	Low	0.43		
Bf	0-11	28-40	0.06-0.2	0.19-0.21	7.9-9.0	<4	Moderate	0.37	5	4L
Belen	11-26	40-50	0.06-0.2	0.14-0.16	7.9-9.0	<4	High	0.37		
	26-60	10-20	0.6-2.0	0.13-0.15	7.9-9.0	<4	Low	0.43		
Bg	0-11	40-50	0.06-0.2	0.14-0.16	7.9-9.0	<4	High	0.37	5	4
Belen	11-30	40-50	0.06-0.2	0.14-0.16	7.9-9.0	<4	High	0.37		
	30-60	10-20	0.6-2.0	0.13-0.15	7.9-9.0	<4	Low	0.43		
BH*	0-4	28-50	0.06-0.2	0.08-0.12	7.9-9.0	>4	High	0.37	5	4L
Belen Variant	4-21	40-50	<0.06	0.08-0.10	7.9-9.0	>4	High	0.37		
	21-38	8-18	0.6-2.0	0.08-0.10	7.9-9.0	>4	Low	0.43		
	38-60	0-10	2.0-6.0	0.07-0.09	7.9-9.0	>4	Low	0.37		
BJ*:										
Berino	0-4	5-15	2.0-6.0	0.09-0.11	6.6-7.8	<2	Low	0.17	3	2
	4-60	20-35	0.6-2.0	0.13-0.17	7.4-8.4	2-4	Moderate	0.32		
Bucklebar	0-6	10-20	2.0-6.0	0.08-0.13	7.4-8.4	<2	Low	0.24	5	3
	6-25	20-35	0.6-2.0	0.13-0.17	7.4-8.4	<2	Moderate	0.32		
	25-38	10-25	0.6-2.0	0.13-0.17	7.4-8.4	<2	Low	0.37		
	38-60	10-30	0.6-2.0	0.13-0.19	7.9-8.4	<2	Moderate	0.37		
Dona Ana	0-5	5-15	2.0-6.0	0.10-0.13	7.4-8.4	<2	Low	0.24	2	3
	5-60	18-35	0.6-2.0	0.13-0.17	7.9-8.4	2-4	Moderate	0.32		
BK*:										
Berino	0-5	15-20	2.0-6.0	0.10-0.13	6.6-7.8	<2	Low	0.24	3	3
	5-60	20-35	0.6-2.0	0.13-0.17	7.4-8.4	2-4	Moderate	0.32		

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay <2mm	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group
								K	T	
	In	Pct	In/hr	In/in	pH	Mmhos/cm				
BK*:										
Dona Ana	0-6	5-15	2.0-6.0	0.10-0.13	7.4-8.4	<2	Low	0.24	2	3
	6-60	18-35	0.6-2.0	0.13-0.17	7.9-8.4	2-4	Moderate	0.32		
BL*:										
Berino	0-8	15-20	2.0-6.0	0.10-0.13	6.6-7.8	<2	Low	0.24	3	3
	8-60	20-35	0.6-2.0	0.13-0.17	7.4-8.4	2-4	Moderate	0.32		
Pintura	0-60	5-10	6.0-20	0.05-0.08	7.9-8.4	<2	Low	0.20	5	2
Bm	0-12	5-8	6.0-20	0.06-0.10	7.9-9.0	<8	Low	0.15	5	2
Bluepoint	12-60	5-8	6.0-20	0.06-0.10	7.9-9.0	<8	Low	0.15		
Bn	0-18	5-8	6.0-20	0.06-0.10	7.9-9.0	<8	Low	0.15	5	2
Bluepoint	18-60	5-8	6.0-20	0.06-0.10	7.9-9.0	<8	Low	0.15		
BO	0-17	5-8	6.0-20	0.06-0.10	7.9-9.0	<8	Low	0.15	5	2
Bluepoint	17-60	5-8	6.0-20	0.06-0.10	7.9-9.0	<8	Low	0.15		
BP*:										
Bluepoint	0-19	5-8	6.0-20	0.06-0.10	7.9-9.0	<8	Low	0.15	5	2
	19-60	5-8	6.0-20	0.06-0.10	7.9-9.0	<8	Low	0.15		
Caliza	0-22	15-20	2.0-6.0	0.05-0.07	7.9-8.4	2-4	Low	0.17	5	8
	22-60	0-15	6.0-20	0.03-0.05	7.9-8.4	2-4	Low	0.15		
Yturbide	0-15	3-15	2.0-6.0	0.06-0.08	6.6-8.4	<2	Low	0.20	5	2
	15-26	0-15	6.0-20	0.04-0.06	6.6-8.4	<2	Low	0.17		
	26-60	10-15	6.0-20	0.04-0.06	6.6-8.4	<2	Low	0.17		
Br	0-5	0-15	6.0-20	0.06-0.10	7.4-8.4	2-4	Low	---	---	1
Brazito	5-60	0-10	6.0-20	0.04-0.06	7.4-8.4	<2	Low	---		
Bs	0-15	10-30	2.0-6.0	0.11-0.17	7.4-8.4	2-4	Low	---	---	3
Brazito	15-60	0-10	6.0-20	0.04-0.06	7.4-8.4	<2	Low	---		
CA*:										
Cacique	0-6	0-15	6.0-20	0.05-0.08	6.6-7.8	<2	Low	0.32	2	2
	6-25	25-30	0.6-2.0	0.14-0.16	7.4-8.4	<2	Moderate	0.32		
	25	---	---	---	---	---	---	---		
Cruces	0-2	0-15	6.0-20	0.05-0.10	6.6-7.8	<2	Low	0.15	1	2
	2-14	15-30	0.6-2.0	0.13-0.16	7.4-8.4	<2	Low	0.28		
	14	---	---	---	---	---	---	---		
Simona	0-7	10-15	6.0-20	0.06-0.10	7.4-8.4	<2	Low	0.32	1	2
	7-18	15-20	2.0-6.0	0.09-0.15	7.4-8.4	<2	Low	0.32		
	18	---	---	---	---	---	---	---		
Cb*:										
Canutio	0-10	10-15	2.0-6.0	0.05-0.10	7.9-8.4	<2	Low	0.10	5	---
	10-60	5-15	2.0-6.0	0.04-0.08	7.9-8.4	<2	Low	0.10		
Arizo	0-15	10-15	6.0-20	0.05-0.07	7.4-8.4	<2	Low	0.10	5	---
	15-60	0-8	>20	0.04-0.06	7.4-8.4	<2	Low	0.10		
CH*:										
Cave	0-16	8-14	0.6-2.0	0.07-0.12	7.9-8.4	2-4	Low	0.28	1	4L
	16	---	---	---	---	---	---	---		
Harrisburg	0-3	5-15	2.0-6.0	0.10-0.14	7.4-8.4	<2	Low	0.24	3	3
	3-24	5-15	2.0-6.0	0.10-0.15	7.4-8.4	<2	Low	0.24		
	24	---	---	---	---	---	---	---		
DR*:										
Dona Ana	0-5	5-15	2.0-6.0	0.10-0.13	7.4-8.4	<2	Low	0.24	2	3
	5-60	18-35	0.6-2.0	0.13-0.17	7.9-8.4	2-4	Moderate	0.32		

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay <2mm	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group
								K	T	
	In	Pct	In/hr	In/in	pH	Mmhos/cm				
DR*:										
Reagan	0-23	18-35	0.6-2.0	0.15-0.20	7.9-8.4	<4	Moderate	0.32	5	4L
	23-71	20-40	0.6-2.0	0.10-0.16	7.9-8.4	<4	Moderate	0.32		
DS.										
Dumps										
Ge	0-8	15-25	0.6-2.0	0.13-0.15	7.9-8.4	2-4	Low	0.43	5	3
Glendale	8-60	25-35	0.2-0.6	0.16-0.21	7.9-8.4	2-4	Moderate	---		
Gf	0-8	28-35	0.2-0.6	0.16-0.21	7.9-8.4	2-4	Moderate	0.37	5	4L
Glendale	8-60	25-35	0.2-0.6	0.16-0.21	7.9-8.4	2-4	Moderate	---		
Gg	0-12	28-35	0.2-0.6	0.16-0.21	7.9-9.0	4-16	Moderate	---	---	---
Glendale	12-60	25-35	0.2-0.6	0.16-0.21	7.9-9.0	4-16	Moderate	---		
HD*.										
Haplargids										
Hf	0-13	15-20	0.6-6.0	0.08-0.12	7.4-8.4	<4	Low	0.20	5	3
Harkey	13-56	10-28	0.6-2.0	0.13-0.19	7.4-8.4	<4	Low	0.49		
	56-60	5-10	6.0-20.0	0.06-0.09	8.5-9.0	<4	Low	0.17		
Hg	0-18	15-28	0.6-2.0	0.13-0.19	7.4-8.4	<4	Low	0.49	5	4L
Harkey	18-60	10-28	0.6-2.0	0.13-0.19	7.4-8.4	<4	Low	0.49		
Hh	0-10	15-28	0.6-2.0	0.07-0.13	8.5-9.0	4-16	Low	0.49	5	4L
Harkey	10-47	15-28	0.6-2.0	0.07-0.13	8.5-9.0	4-16	Low	0.49		
	47-60	5-10	6.0-20.0	0.06-0.09	8.5-9.0	4-16	Low	0.17		
Hk	0-12	28-38	0.2-0.6	0.15-0.19	7.4-8.4	<4	Moderate	0.32	5	4L
Harkey	12-60	10-28	0.6-2.0	0.13-0.19	7.4-8.4	<4	Low	0.49		
MN*:										
Masonfort	0-3	15-20	2.0-6.0	0.08-0.13	7.9-8.4	<2	Low	0.28	1	3
	3-18	15-20	2.0-6.0	0.07-0.12	7.9-8.4	<2	Low	0.24		
	18	---	---	---	---	---	---	---		
Nickel	0-8	10-15	2.0-6.0	0.06-0.09	7.9-8.4	<2	Low	0.20	5	---
	8-60	10-15	0.2-0.6	0.04-0.07	7.9-8.4	<2	Low	0.17		
Mo	0-10	28-35	0.2-0.6	0.16-0.21	7.4-8.4	<4	Moderate	0.43	5	6
Mimbres	10-60	18-35	0.2-0.6	0.16-0.21	7.9-8.4	<4	Moderate	0.43		
MR*:										
Minlith	0-3	0-15	6.0-20	0.06-0.09	6.6-7.3	<2	Low	0.20	1	1
	3-13	10-15	6.0-20	0.03-0.06	6.6-8.4	<2	Low	0.15		
	13	---	---	---	---	---	---	---		
Rock outcrop.										
Onite	0-5	5-10	6.0-20	0.06-0.10	7.4-7.8	<2	Low	0.17	5	2
	5-27	10-15	2.0-6.0	0.07-0.12	7.4-8.4	<2	Low	0.24		
	27-60	5-10	2.0-20	0.06-0.12	7.9-8.4	<2	Low	0.24		
MS*:										
Motoqua	0-2	10-27	0.6-2.0	0.08-0.10	6.6-7.3	<2	Low	0.20	1	8
	2-20	10-27	0.6-2.0	0.09-0.11	6.6-7.3	<2	Low	0.20		
	20	---	---	---	---	---	---	---		
Rock outcrop.										
NB*:										
Nickel	0-2	10-15	2.0-6.0	0.07-0.09	7.9-8.4	<2	Low	0.17	5	---
	2-60	10-15	0.2-0.6	0.04-0.07	7.9-8.4	<2	Low	0.17		
Badland.										

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay <2mm	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group
								K	T	
	In	Pct	In/hr	In/in	pH	Mmhos/cm				
NU*:										
Nickel	0-5	10-15	2.0-6.0	0.07-0.09	7.9-8.4	<2	Low	0.17	5	---
	5-60	10-15	0.2-0.6	0.04-0.07	7.9-8.4	<2	Low	0.17		
Upton	0-14	15-30	0.6-2.0	0.08-0.14	7.9-8.4	<2	Low	0.28	2	---
	14-22	---	---	---	7.9-8.4	<2	Very low	---		
	22-60	---	---	---	---	---	---	---		
OP*:										
Onite	0-5	3-8	6.0-20	0.06-0.10	7.4-7.8	<2	Low	0.17	5	2
	5-18	5-12	2.0-6.0	0.07-0.12	7.4-8.4	<2	Low	0.24		
	18-60	5-15	2.0-20	0.06-0.12	7.9-8.4	<2	Low	0.24		
Pajarito	0-8	15-20	2.0-6.0	0.13-0.15	7.4-8.4	<2	Low	0.24	5	3
	8-25	15-20	2.0-6.0	0.13-0.15	7.9-8.4	<2	Low	0.24		
	25-60	15-24	2.0-6.0	0.13-0.15	7.9-8.4	<2	Low	0.24		
Pintura	0-60	5-10	6.0-20	0.05-0.08	7.4-8.4	<2	Low	0.20	5	2
OR*:										
Onite	0-5	3-8	6.0-20	0.06-0.10	7.4-7.8	<2	Low	0.17	5	2
	5-20	5-12	2.0-6.0	0.07-0.12	7.4-8.4	<2	Low	0.24		
	20-60	5-15	2.0-20	0.06-0.12	7.9-8.4	<2	Low	0.24		
Pintura	0-60	5-10	6.0-20	0.05-0.08	7.4-8.4	<2	Low	0.20	5	2
Pa	0-12	15-20	2.0-6.0	0.13-0.15	7.4-8.4	<2	Low	0.24	5	3
Pajarito	12-20	15-20	2.0-6.0	0.13-0.15	7.9-8.4	<2	Low	0.24		
	20-60	15-24	2.0-6.0	0.13-0.15	7.9-8.4	<2	Low	0.24		
Pb*:										
Pajarito	0-14	10-15	2.0-6.0	0.09-0.11	7.4-8.4	<2	Low	0.17	5	2
	14-28	15-20	2.0-6.0	0.13-0.15	7.9-8.4	<2	Low	0.24		
	28-60	15-24	2.0-6.0	0.13-0.15	7.9-8.4	<2	Low	0.24		
Pintura	0-10	5-10	6.0-20	0.05-0.08	7.4-8.4	<2	Low	0.20	5	2
	10-60	5-10	6.0-20	0.03-0.08	7.4-8.4	<2	Low	0.20		
PN*:										
Pinaleno	0-2	8-15	2.0-6.0	0.04-0.07	6.6-7.8	<2	Low	0.17	5	---
	2-20	15-25	0.2-0.6	0.05-0.09	7.4-8.4	<2	Low	0.17		
	20-37	10-15	2.0-6.0	0.04-0.07	7.9-8.4	<2	Low	0.15		
	37-60	5-10	2.0-6.0	0.03-0.06	7.9-8.4	<2	Low	0.15		
Nolam	0-2	15-20	2.0-6.0	0.04-0.06	7.4-8.4	<2	Low	0.17	3	8
	2-17	20-35	0.6-2.0	0.04-0.08	7.4-8.4	<2	Low	0.17		
	17-40	15-20	2.0-6.0	0.04-0.06	7.9-8.4	<2	Low	0.17		
	40-71	0-20	6.0-20	0.04-0.06	7.9-8.4	<2	Low	0.17		
RE.										
Riverwash										
RF*:										
Riverwash.										
Arizo	0-12	3-8	6.0-20	0.05-0.07	7.4-8.4	<2	Low	0.10	5	---
	12-60	2-6	>20	0.04-0.06	7.4-8.4	<2	Low	0.10		
RG*:										
Rock outcrop.										
Argids.										
RH*:										
Rock outcrop.										
Argids.										

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay <2mm	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group
								K	T	
	In	Pct	In/hr	In/in	pH	Mmhos/cm				
RL*:										
Rock outcrop.										
Lozier	0-6	20-25	0.6-2.0	0.05-0.10	7.9-8.4	<2	Low	0.10	1	8
	6-11	20-25	0.6-2.0	0.05-0.10	7.9-8.4	<2	Low	0.10		
	11-60	---	---	---	---	---	---	---		
RT*:										
Rock outcrop.										
Torriorthents.										
SH*:										
Simona	0-2	15-20	2.0-6.0	0.11-0.15	7.4-8.4	<2	Low	0.37	1	3
	2-12	15-20	2.0-6.0	0.09-0.15	7.4-8.4	<2	Low	0.32		
	12	---	---	---	---	---	---	---		
Harrisburg	0-8	5-15	2.0-6.0	0.10-0.14	7.4-8.4	<2	Low	0.24	3	3
	8-24	5-15	2.0-6.0	0.10-0.15	7.4-8.4	<2	Low	0.24		
	24	---	---	---	---	---	---	---		
ST*:										
Stellar	0-3	28-40	0.2-0.6	0.19-0.21	7.4-8.4	<2	Moderate	0.28	5	6
	3-28	28-50	0.06-0.2	0.14-0.16	7.4-8.4	2-4	High	0.28		
	28-60	28-40	0.2-0.6	0.15-0.19	7.4-8.4	2-4	Moderate	0.28		
Stellar, flooded	0-5	30-40	0.2-0.6	0.19-0.21	7.4-8.4	<2	Moderate	0.28	5	4
	5-31	40-50	0.06-0.2	0.14-0.16	7.4-8.4	<2	High	0.24		
	31-60	20-40	0.2-0.6	0.19-0.21	7.4-8.4	<2	Moderate	0.28		
TE*:										
Tencee	0-7	10-20	0.6-2.0	0.05-0.10	7.9-8.4	<2	Low	0.15	1	---
	7	---	---	---	---	---	---	---		
Upton	0-16	15-30	0.6-2.0	0.08-0.14	7.9-8.4	<2	Low	0.28	2	---
	16-22	---	---	---	7.9-8.4	<2	Very low	---		
	22-60	---	---	---	---	---	---	---		
TF*:										
Terino	0-2	15-20	2.0-6.0	0.03-0.10	7.4-8.4	<2	Low	0.17	1	8
	2-15	15-25	0.2-0.6	0.03-0.10	7.9-8.4	<2	Low	0.17		
	15-32	---	---	---	---	---	---	---		
	32-60	5-10	2.0-6.0	<0.03	7.9-8.4	2-8	Low	0.17		
Casito	0-6	10-20	2.0-6.0	0.03-0.10	7.4-8.4	<2	Low	0.17	1	3
	6-12	20-30	0.6-2.0	0.03-0.10	7.4-8.4	<2	Low	0.17		
	12-28	---	---	---	---	---	---	---		
	28-60	10-18	2.0-6.0	<0.03	7.4-8.4	<2	Low	0.17		
Pinaleno	0-2	5-10	2.0-6.0	0.04-0.07	6.6-7.8	<2	Low	0.17	5	---
	2-30	15-25	0.2-2.0	0.05-0.09	7.4-8.4	<2	Low	0.17		
	30-40	10-15	2.0-6.0	0.04-0.07	7.9-8.4	<2	Low	0.15		
	40-60	5-10	2.0-6.0	0.03-0.06	7.9-8.4	<2	Low	0.15		
Vf	0-14	8-15	0.6-6.0	0.12-0.15	7.9-8.4	<2	Low	0.28	5	3
Vinton Variant	14-32	3-8	2.0-6.0	0.06-0.09	7.9-8.4	<2	Low	0.17		
	32-42	28-32	0.2-0.6	0.15-0.17	7.9-8.4	<2	Moderate	0.32		
	42-60	0-5	6.0-20	0.05-0.07	7.9-8.4	<2	Low	0.10		
Vg	0-16	20-25	0.6-2.0	0.14-0.16	7.9-8.4	<2	Moderate	0.32	5	4L
Vinton Variant	16-33	0-5	2.0-6.0	0.06-0.09	7.9-8.4	<2	Low	0.17		
	33-60	28-32	0.2-0.6	0.15-0.17	7.9-8.4	<2	Moderate	0.32		
WH*:										
Wink	0-2	5-10	2.0-6.0	0.08-0.14	7.9-8.4	<2	Low	0.20	3	3
	2-26	5-10	2.0-6.0	0.10-0.15	7.9-8.4	<2	Low	0.20		
	26-60	5-10	2.0-6.0	0.00-0.06	7.9-8.4	<2	Very low	0.20		

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay <2mm	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group
								K	T	
	In	Pct	In/hr	In/in	pH	Mmhos/cm				
WH*:										
Harrisburg	0-4	5-15	2.0-6.0	0.08-0.11	7.4-8.4	<2	Low	0.17	3	2
	4-24	5-15	2.0-6.0	0.10-0.15	7.4-8.4	<2	Low	0.24		
	24	---	---	---	---	---	---	---		
Simona	0-2	15-20	2.0-6.0	0.11-0.15	7.4-8.4	<2	Low	0.37	1	3
	2-7	15-20	2.0-6.0	0.09-0.15	7.4-8.4	<2	Low	0.32		
	7	---	---	---	---	---	---	---		
WP*:										
Wink	0-10	5-10	2.0-6.0	0.08-0.14	7.9-8.4	<2	Low	0.20	3	3
	10-20	5-10	2.0-6.0	0.10-0.15	7.9-8.4	<2	Low	0.20		
	20-60	5-10	2.0-6.0	0.00-0.06	7.9-8.4	<2	Very low	0.20		
Pintura	0-60	---	6.0-20	0.05-0.08	7.4-8.4	<2	Low	0.20	5	2

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--SOIL AND WATER FEATURES

[The definition of "flooding" in the Glossary explains the terms "brief" and "very brief." The symbol > means more than. Absence of an entry indicates that the feature is not a concern]

Soil name and map symbol	Hydrologic group	Flooding			High water table	Bedrock		Cemented pan		Risk of corrosion	
		Frequency	Duration	Months	Depth	Depth	Hardness	Depth	Hardness	Uncoated steel	Concrete
					Ft	In		In			
Ad, Ae---------- Adelino	B	None---------	---	---	>6.0	>60	---	---	---	High------	Low.
AF*: Aftaden----------	D	None---------	---	---	>6.0	11-20	Hard	---	---	Low-------	Low.
Rock outcrop.											
Onite----------	B	None---------	---	---	>6.0	>60	---	---	---	Moderate	Low.
Ag, Ah---------- Agua	B	Common-------	Brief------	Jun-Sep	>6.0	>60	---	---	---	High------	Low.
AJ*---------- Agua Variant	D	Common-------	Brief------	Jun-Sep	1.0-3.5	>60	---	---	---	High------	High.
AK*: Agua Variant-----	D	Common-------	Brief------	Jun-Sep	1.0-3.5	>60	---	---	---	High------	High.
Belen Variant----	D	Common-------	Brief------	Jun-Sep	1.0-3.0	>60	---	---	---	High------	High.
AL*: Akela----------	D	None---------	---	---	>6.0	10-20	Hard	---	---	High------	Low.
Rock outcrop.											
Akela----------	D	None---------	---	---	>6.0	10-20	Hard	---	---	High------	Low.
AM*: Aladdin----------	B	Rare---------	---	---	>6.0	>60	---	---	---	Low-------	Low.
Coxwell----------	C	None---------	---	---	>6.0	20-40	Rippable	---	---	Moderate	Low.
An, Ao---------- Anapra	B	Rare---------	---	---	>6.0	>60	---	---	---	High------	Low.
Ap*, Ar*, As*: Anthony----------	B	Rare---------	---	---	>6.0	>60	---	---	---	High------	Low.
Vinton----------	B	Rare---------	---	---	>6.0	>60	---	---	---	Moderate	Low.
At, Aw, Ax-------- Armijo	D	None---------	---	---	>6.0	>60	---	---	---	High------	Low.
Be, Bf, Bg-------- Belen	D	None---------	---	---	>6.0	>60	---	---	---	High------	Low.
BH*---------- Belen Variant	D	Common-------	Brief------	Jun-Sep	1.0-3.0	>60	---	---	---	High------	High.

See footnote at end of table.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table	Bedrock		Cemented pan		Risk of corrosion	
		Frequency	Duration	Months	Depth	Depth	Hardness	Depth	Hardness	Uncoated steel	Concrete
					Ft	In		In			
BJ*:											
Berino	B	None	---	---	>6.0	>60	---	---	---	Low	Low.
Bucklebar	B	None	---	---	>6.0	>60	---	---	---	Low	Low.
Dona Ana	B	None	---	---	>6.0	>60	---	---	---	High	Low.
BK*:											
Berino	B	None	---	---	>6.0	>60	---	---	---	Low	Low.
Dona Ana	B	None	---	---	>6.0	>60	---	---	---	High	Low.
BL*:											
Berino	B	None	---	---	>6.0	>60	---	---	---	Low	Low.
Pintura	A	None	---	---	>6.0	>60	---	---	---	High	Low.
Bm Bluepoint	A	Rare	---	---	>6.0	>60	---	---	---	High	High.
Bn, BO Bluepoint	A	Rare	---	---	>6.0	>60	---	---	---	High	High.
BP*:											
Bluepoint	A	Rare	---	---	>6.0	>60	---	---	---	High	High.
Caliza	B	None	---	---	>6.0	>60	---	---	---	Moderate	Low.
Yturbide	A	None	---	---	>6.0	>60	---	---	---	Low	Low.
Br, Bs Brazito	A	None	---	---	>6.0	>60	---	---	---	Moderate	Low.
CA*:											
Cacique	C	None	---	---	>6.0	>60	---	20-40	Hard	Low	Low.
Cruces	C	None	---	---	>6.0	>60	---	8-20	Hard	Low	Low.
Simona	D	None	---	---	>6.0	>60	---	7-20	Hard	Moderate	Low.
Cb*:											
Canutio	B	Rare	---	---	>6.0	>60	---	---	---	High	Low.
Arizo	A	Common	Very brief	Mar-Sep	>6.0	>60	---	---	---	Moderate	Low.
CH*:											
Cave	D	None	---	---	>6.0	>60	Hard	4-20	Hard	High	Low.
Harrisburg	C	None	---	---	>6.0	>60	---	24-40	Hard	High	Low.
DR*:											
Dona Ana	B	None	---	---	>6.0	>60	---	---	---	High	Low.
Reagan	B	None	---	---	>6.0	>60	---	---	---	Moderate	Low.

See footnote at end of table.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table	Bedrock		Cemented pan		Risk of corrosion	
		Frequency	Duration	Months	Depth	Depth	Hardness	Depth	Hardness	Uncoated steel	Concrete
					Ft	In		In			
DS. Dumps											
Ge, Gf---------- Glendale	B	Rare---------	Brief-----	Jul-Sep	>6.0	>60	---	---	---	High-----	Low.
Gg---------- Glendale	B	Rare---------	---	---	>6.0	>60	---	---	---	High-----	Moderate.
HD*. Haplargids											
Hf, Hg---------- Harkey	B	None---------	---	---	>6.0	>60	---	---	---	High-----	Low.
Hh---------- Harkey	C	None to rare	---	---	>6.0	>60	---	---	---	High-----	Moderate.
Hk---------- Harkey	B	None---------	---	---	>6.0	>60	---	---	---	High-----	Low.
MN*: Masonfort---------	C	None---------	---	---	>6.0	10-20	Rippable	---	---	High-----	Low.
Nickel-----------	B	None---------	---	---	>6.0	>60	---	---	---	High-----	Low.
Mo---------- Mimbres	C	Common-------	Very brief	Jul-Sep	>6.0	>60	---	---	---	High-----	Low.
MR*: Minlith----------	D	None---------	---	---	>6.0	10-20	Hard	---	---	Moderate	Low.
Rock outcrop.											
Onite------------	B	None---------	---	---	>6.0	>60	---	---	---	Moderate	Low.
MS*: Motoqua----------	D	None---------	---	---	>6.0	10-20	Hard	---	---	High-----	Low.
Rock outcrop.											
NB*: Nickel-----------	B	None---------	---	---	>6.0	>60	---	---	---	High-----	Low.
Badland.											
NU*: Nickel-----------	B	None---------	---	---	>6.0	>60	---	---	---	High-----	Low.
Upton------------	C	None---------	---	---	>6.0	>60	---	7-20	Rippable	High-----	Low.
OP*: Onite------------	B	None---------	---	---	>6.0	>60	---	---	---	Moderate	Low.

See footnote at end of table.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table	Bedrock		Cemented pan		Risk of corrosion	
		Frequency	Duration	Months	Depth	Depth	Hardness	Depth	Hardness	Uncoated steel	Concrete
					Ft	In		In			
OP*:											
Pajarito	B	None	---	---	>6.0	>60	---	---	---	High	Low.
Pintura	A	None	---	---	>6.0	>60	---	---	---	High	Low.
OR*:											
Onite	B	None	---	---	>6.0	>60	---	---	---	Moderate	Low.
Pintura	A	None	---	---	>6.0	>60	---	---	---	High	Low.
Pa Pajarito	B	None	---	---	>6.0	>60	---	---	---	High	Low.
Pb*:											
Pajarito	B	None	---	---	>6.0	>60	---	---	---	High	Low.
Pintura	A	None	---	---	>6.0	>60	---	---	---	High	Low.
PN*:											
Pinaleno	B	None	---	---	>6.0	>60	---	---	---	High	Low.
Nolam	B	None	---	---	>6.0	>60	---	---	---	Moderate	Low.
RE. Riverwash											
RF*: Riverwash.											
Arizo	A	Common	Very brief	Mar-Sep	>6.0	>60	---	---	---	Moderate	Low.
RG*: Rock outcrop.											
Argids.											
RH*: Rock outcrop.											
Argids.											
RL*: Rock outcrop.											
Lozier	D	None	---	---	>6.0	4-16	Hard	---	---	High	Low.
RT*: Rock outcrop.											
Torriorthents.											

See footnote at end of table.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table	Bedrock		Cemented pan		Risk of corrosion	
		Frequency	Duration	Months	Depth	Depth	Hardness	Depth	Hardness	Uncoated steel	Concrete
					Ft	In		In			
SH*:											
Simona	D	None	---	---	>6.0	>60	---	7-20	Hard	Moderate	Low.
Harrisburg	C	None	---	---	>6.0	>60	---	24-40	Hard	High	Low.
ST*:											
Stellar	C	None	---	---	>6.0	>60	---	---	---	High	Low.
Stellar	C	Common	Very brief	Jul-Sep	>6.0	>60	---	---	---	High	Low.
TE*:											
Tencee	D	None	---	---	>6.0	>60	---	7-20	Hard	High	Low.
Upton	C	None	---	---	>6.0	>60	---	7-20	Rippable	High	Low.
TF*:											
Terino	D	None	---	---	>6.0	>60	---	8-20	Rippable	High	Low.
Casito	D	None	---	---	>6.0	>60	---	8-20	Rippable	High	Low.
Pinaleno	B	None	---	---	>6.0	>60	---	---	---	High	Low.
Vf, Vg Vinton Variant	B	Common	Brief	Jun-Sep	>6.0	>60	---	---	---	High	Low.
WH*:											
Wink	B	None	---	---	>6.0	>60	---	---	---	High	Low.
Harrisburg	C	None	---	---	>6.0	>60	---	24-40	Hard	High	Low.
Simona	D	None	---	---	>6.0	>60	---	7-20	Hard	Moderate	Low.
WP*:											
Wink	B	None	---	---	>6.0	>60	---	---	---	High	Low.
Pintura	A	None	---	---	>6.0	>60	---	---	---	High	Low.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--ENGINEERING INDEX TEST DATA

[Tests made by New Mexico State Highway Department, Materials Testing Laboratory, Santa Fe, N. Mex.]

Soil name and location	Parent material	New Mexico State Highway Dept. report no.	Depth	Horizon	Mechanical analysis[1]: percentage passing sieve[2]--								Liquid limit	Plasticity index	Classification	
					3 in.	2 in.	1 in.	3/4 in.	3/8 in.	No. 4	No. 10	No. 40	No. 200			AASHTO	Unified
			In.														
Adelino clay loam: SE1/4SW1/4 sec. 11, T. 21 S., R. 1 W., south of gravel pit 100 yds. in SE corner of abandoned field.	Mixed old alluvium	0095	0-5	Ap2							100	97	81	31	10	A-4	CL
		0096	14-20	B22							100	95	70	31	10	A-4	CL
		0097	35-46	C2ca							100	98	79	31	12	A-6	CL
Anthony loam: 33 feet east of last big tree on south side of road, 1,000 feet east of entrance to Darbyshire farmstead, 90 feet south into field. NE corner sec. 27, T. 26 S., R. 3 E.	Mixed alluvium	0111	0-6	Ap1							100	99	66	NP	NP[3]	A-4	ML
		0112	37-48	C2							100	98	33	NP	NP	A-2-4	SM
Belen clay: 620 feet west of SE corner of NW1/4-NE1/4 sec. 25, T. 23 S., R. 1 E., 110 feet from NE corner of field 15 feet south into field.	Mixed alluvium	0101	11-24	C1							100	99	93	51	24	A-7	CH
		0102	24-30	C2							100	98	90	44	15	A-7	ML
		0103	35-60	IIC4							100	99	51	NP	NP	A-4	ML
Bluepoint loamy sand: 300 feet east of Interstate 10 right-of-way, directly east of the port of entry about 3 miles north of Anthony, NM.	Mixed alluvium modified by wind	0071	0-18	A1							100	92	19	NP	NP	A-2-4	SM
		0072	18-66	C1							100	88	22	NP	NP	A-2-4	SM
Bucklebar sandy loam: West bank of gully about 0.1 mile south of Highway 70, in NE1/4 sec. 18, T. 22 S., R. 3 E.	Mixed alluvium	0081	0-2	A-2							100	84	52	NP	NP	A-4	ML
		0082	6-15	B21t							100	83	56	28	10	A-4	CL
		0083	25-38	C1ca							100	92	75	27	7	A-4	CL-ML

See footnotes at end of table.

TABLE 16.--ENGINEERING INDEX TEST DATA--Continued

Soil name and location	Parent material	New Mexico State Highway Dept. report no.	Depth	Horizon	Mechanical analysis[1]: percentage passing sieve[2]--								Liquid limit	Plasticity index	Classification	
					3 in.	2 in.	1 in.	3/4 in.	3/8 in.	No. 4	No. 10	No. 40	No. 200			AASHTO	Unified
			In.													
Cacique sandy loam: South bank of erosion trench 1/10 mile east of NE taxiway, Las Cruces Municipal Airport, NE1/4 sec. 23, T. 23 S., R. 1 W. R. 1 W.	Mixed alluvium	0090	0-2	A1							100	80	10	NP	NP	A-3	SP-SM
		0091	6-12	B21t							100	89	16	NP	NP	A-2-4	SM
Dona Ana fine sandy loam: SW corner of NE1/4 sec. 23, T. 22 S., R. 2 E., south bank of gully.	Mixed alluvium	0078	2-6	A3							100	94	28	NP	NP	A-2-4	SM
		0079	11-15	B22tca							100	89	37	NP	NP	A-4	SM
		0080	39-60	C2ca							100	89	22	NP	NP	A-2-4	SM
Glendale clay loam: NE corner SW1/4 SW1/4NE1/4 sec. 5, T. 27 S., R. 3 E., south boundary road of Chapell farm, 50 feet north into field.	Mixed alluvium	0108	0-14	Ap							100	99	89	33	11	A-6	CL-ML
		0109	14-20	C1							100	99	85	33	14	A-6	CL
		0110	40-50	C4							100	99	92	NP	NP	A-4	ML
Harkey clay loam: NE corner of NE1/4 SW1/4 sec. 7, T. 26 S., R. 3 E.	Mixed alluvium	0106	0-12	Ap							100	99	82	35	15	A-6	CL
		0107	43-60	C3							100	99	86	NP	NP	A-4	ML
Nickel gravelly loamy sand: Near the center of NW1/4 sec. 17, T. 19 S., R. 3 W.	Mixed alluvium	0087	0-3	A1		100	86	84	79	76	74	69	23	NP	NP	A-2-4	SM
		0088	10-18	C1ca	100	89	61	56	43	35	29	19	5	NP	NP	A-1-a	GW-GM
		0089	28-60	C3		100	75	72	67	60	52	34	8	NP	NP	A-1-b	SW-SM
Pajarito fine sandy loam: 12 feet south of twin power slopes, next to old highway 950 feet southeast of Lindbick farmstead.	Mixed alluvium	0092	0-12	A1							100	84	30	NP	NP	A-2-4	SM
		0093	12-24	B2							100	89	23	NP	NP	A-2-4	SM
		0094	28-40	C1ca							100	87	41	NP	NP	A-4	SM

See footnotes at end of table.

TABLE 16.--ENGINEERING INDEX TEST DATA--Continued

Soil name and location	Parent material	New Mexico State Highway Dept. report no.	Depth	Horizon	Mechanical analysis[1]: percentage passing sieve[2]--								Liquid limit	Plasticity index	Classification	
					3 in.	2 in.	1 in.	3/4 in.	3/8 in.	No. 4	No. 10	No. 40	No. 200			AASHTO	Unified
			In.													
Terino very gravelly fine sandy loam:																
SE1/4SW1/4 sec.	Mixed	0075	0-2	A1		100	98	95	85	77	70	64	32	NP	NP	A-2-4	SM
17, T. 23 S., R. 3	alluvium	0076	7-11	B22t	100	93	71	62	48	36	25	21	12	NP	NP	A-1-a	GP-GM
E.; about 50 feet	from	0077	32-48	C3ca		100	89	80	59	39	27	20	11	NP	NP	A-1-a	GP-GM
NE of Solidad	igneous																
Canyon road.	sources																
Vinton fine sandy loam:																
1,600 feet west on	Mixed	0104	0-13	Ap							100	99	43	NP	NP	A-4	SM
Chamberino road out	alluvium	0105	23-41	C1							100	99	16	NP	NP	A-2-4	SM
of Berino, 1,100																	
feet south of road,																	
5 feet west of																	
trees, 250 feet																	
south into field,																	
near SW corner																	
NW1/4NE1/4 sec. 9,																	
T. 26 S., R. 3 E.																	

[1]Analysis according to AASHTO Designation: T 88-57 (1). Results by this procedure frequently differ somewhat from results obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHTO procedure, the fine material is analyzed by the hydrometer method, and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method, and the material coarser than 2 millimeters in diameter is excluded from calculations of grain-size fractions. The mechanical analysis data used in this table are not suitable for use in naming textural classes for soils.

[2]No. 4= 4.7 mm; No. 10= 2.0 mm; No. 40= 0.42 mm; and No. 200= 0.074 mm

[3]NP=Nonplastic.

TABLE 17.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Adelino	Fine-loamy, mixed, thermic Typic Camborthids
Aftaden	Loamy, mixed, thermic Lithic Haplargids
Agua	Coarse-loamy over sandy or sandy-skeletal, mixed (calcareous), thermic Typic Torrifluvents
Agua Variant	Coarse-loamy over sandy or sandy-skeletal, mixed (calcareous), thermic Aquic Ustifluvents
Akela	Loamy-skeletal, mixed (calcareous), thermic Lithic Torriorthents
Aladdin	Coarse-loamy, mixed, thermic Torriorthentic Haplustolls
Anapra	Fine-silty over sandy or sandy-skeletal, mixed (calcareous), thermic Typic Torrifluvents
Anthony	Coarse-loamy, mixed (calcareous), thermic Typic Torrifluvents
Arizo	Sandy-skeletal, mixed, thermic Typic Torriorthents
Armijo	Fine, montmorillonitic, thermic Typic Torrerts
Belen	Clayey over loamy, montmorillonitic (calcareous), thermic Vertic Torrifluvents
Belen Variant	Clayey over loamy, montmorillonitic (calcareous),thermic Aquic Ustifluvents
Berino	Fine-loamy, mixed, thermic Typic Haplargids
Bluepoint	Mixed, thermic Typic Torripsamments
Brazito	Mixed, thermic Typic Torripsamments
Bucklebar	Fine-loamy, mixed, thermic Typic Haplargids
Cacique	Fine-loamy, mixed, thermic Petrocalcic Paleargids
Caliza	Sandy-skeletal, mixed, thermic Typic Calciorthids
Canutio	Loamy-skeletal, mixed (calcareous), thermic Typic Torriorthents
Casito	Loamy-skeletal, mixed, thermic, shallow Petrocalcic Ustollic Paleargids
Cave	Loamy, mixed, thermic, shallow Typic Paleorthids
Coxwell	Loamy-skeletal, mixed, thermic Ustollic Haplargids
Cruces	Loamy, mixed, thermic, shallow Petrocalcic Paleargids
Dona Ana	Fine-loamy, mixed, thermic Typic Haplargids
Glendale	Fine-silty, mixed (calcareous), thermic Typic Torrifluvents
Harkey	Coarse-silty, mixed (calcareous), thermic Typic Torrifluvents
Harrisburg	Coarse-loamy, mixed, thermic Typic Paleorthids
Lozier	Loamy-skeletal, carbonatic, thermic Lithic Calciorthids
Masonfort	Loamy, mixed, thermic, shallow Typic Calciorthids
Mimbres	Fine-silty, mixed, thermic Typic Camborthids
Minlith	Sandy-skeletal, mixed, thermic Lithic Torriorthents
Motoqua	Loamy-skeletal, mixed, mesic Lithic Argiustolls
Nickel	Loamy-skeletal, mixed, thermic Typic Calciorthids
Nolam	Loamy-skeletal, mixed, thermic Ustollic Haplargids
Onite	Coarse-loamy, mixed, thermic Typic Haplargids
Pajarito	Coarse-loamy, mixed, thermic Typic Camborthids
Pinaleno	Loamy-skeletal, mixed, thermic Typic Haplargids
Pintura	Mixed, thermic Typic Torripsamments
Reagan	Fine-silty, mixed, thermic Ustollic Calciorthids
Simona	Loamy, mixed, thermic, shallow Typic Paleorthids
Stellar	Fine, mixed, thermic Ustollic Haplargids
Tencee	Loamy-skeletal, carbonatic, thermic, shallow Typic Paleorthids
Terino	Loamy-skeletal, mixed, thermic, shallow Petrocalcic Ustollic Paleargids
Upton	Loamy, carbonatic, thermic, shallow Typic Paleorthids
Vinton	Sandy, mixed, thermic Typic Torrifluvents
Vinton Variant	Sandy over clayey, mixed, thermic Typic Torrifluvents
Wink	Coarse-loamy, mixed, thermic Typic Calciorthids
Yturbide	Mixed, thermic Typic Torripsamments

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U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

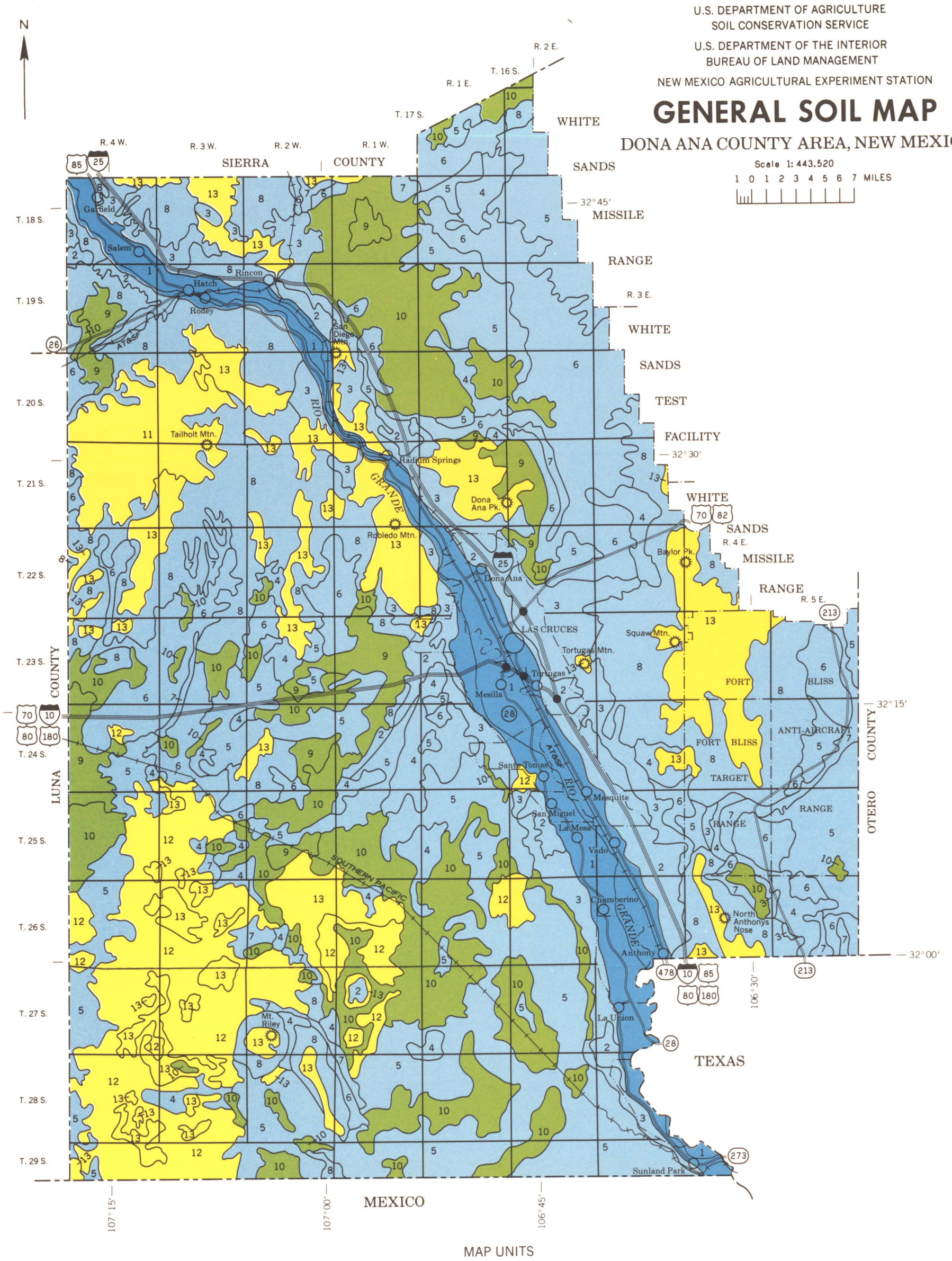
NEW MEXICO AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP

DONA ANA COUNTY AREA, NEW MEXICO

Scale 1: 443,520

1 0 1 2 3 4 5 6 7 MILES



MAP UNITS

DEEP, NEARLY LEVEL, WELL DRAINED SOILS THAT FORMED IN ALLUVIUM; ON FLOOD PLAINS AND STREAM TERRACES

1 Glendale-Harkey: Deep, nearly level, well drained soils that formed in alluvium; on flood plains and stream terraces

SHALLOW OR DEEP, NEARLY LEVEL TO VERY STEEP, WELL DRAINED TO EXCESSIVELY DRAINED SOILS THAT FORMED IN ALLUVIUM, ALLUVIUM MODIFIED BY WIND, AND EOLIAN MATERIAL; ON FANS, TERRACES, RIDGES, VALLEY AND BASIN FLOORS, FLOOD PLAINS, AND PIEDMONTS

2 Bluepoint: Deep, gently undulating to moderately rolling, somewhat excessively drained soils that formed in alluvium modified by wind; on fans, terraces, and ridges

3 Caliza-Bluepoint-Yturbide: Deep, gently undulating to very steep, well drained, somewhat excessively drained, and excessively drained soils that formed in alluvium, gravelly alluvium, and alluvium modified by wind; on fans and terraces

4 Pajarito-Onite-Pintura: Deep, nearly level to undulating, well drained and somewhat excessively drained soils that formed in alluvium, alluvium modified by wind, and eolian material; on fans

5 Pintura-Wink: Deep, nearly level to undulating, well drained and somewhat excessively drained soils that formed in alluvium, alluvium modified by wind, and eolian material; on fans

6 Berino-Dona Ana: Deep, gently undulating to undulating, well drained soils that formed in alluvium and alluvium modified by wind; on fans, piedmonts, and valley and basin floors

7 Mimbres-Stellar: Deep, nearly level to gently undulating, well drained soils that formed in alluvium; on fans, basin floors, and flood plains

8 Nickel-Upton: Shallow or deep, undulating to moderately rolling, well drained soils that formed in gravelly and very gravelly alluvium; on fans, terraces, ridges, and piedmonts

SHALLOW TO DEEP, NEARLY LEVEL TO UNDULATING, WELL DRAINED SOILS THAT FORMED IN RESIDUUM, ALLUVIUM, AND EOLIAN MATERIAL; ON MESAS, PLAINS, RIDGES, BASIN FLOORS, AND FANS

9 Cacique-Cruces: Shallow to moderately deep, nearly level to gently sloping, well drained soils that formed in alluvium; on basin floors

10 Harrisburg-Simona-Wink: Shallow to deep, gently undulating to undulating, well drained soils that formed in residuum from sandstone, eolian material, and alluvium modified by wind; on mesas, plains, ridges, and fans

ROCK OUTCROP AND SHALLOW TO DEEP, GENTLY UNDULATING TO EXTREMELY STEEP, WELL DRAINED SOILS THAT FORMED IN ALLUVIUM, COLLUVIUM, RESIDUUM, AND EOLIAN MATERIAL; ON MOUNTAINS, UPLANDS, AND RIDGES

11 Rock outcrop-Motoqua: Rock outcrop and shallow, moderately rolling to extremely steep, well drained soils that formed in alluvium and colluvium; on mountains

12 Akela-Rock outcrop-Aftaden: Rock outcrop and shallow, gently undulating to moderately rolling, well drained soils that formed in eolian material and residuum from basalt; on lava flows, uplands, and ridges

13 Rock outcrop-Torriorthents: Rock outcrop and shallow to deep, hilly to extremely steep, well drained soils that formed in alluvium and colluvium; on mountains

Compiled 1979

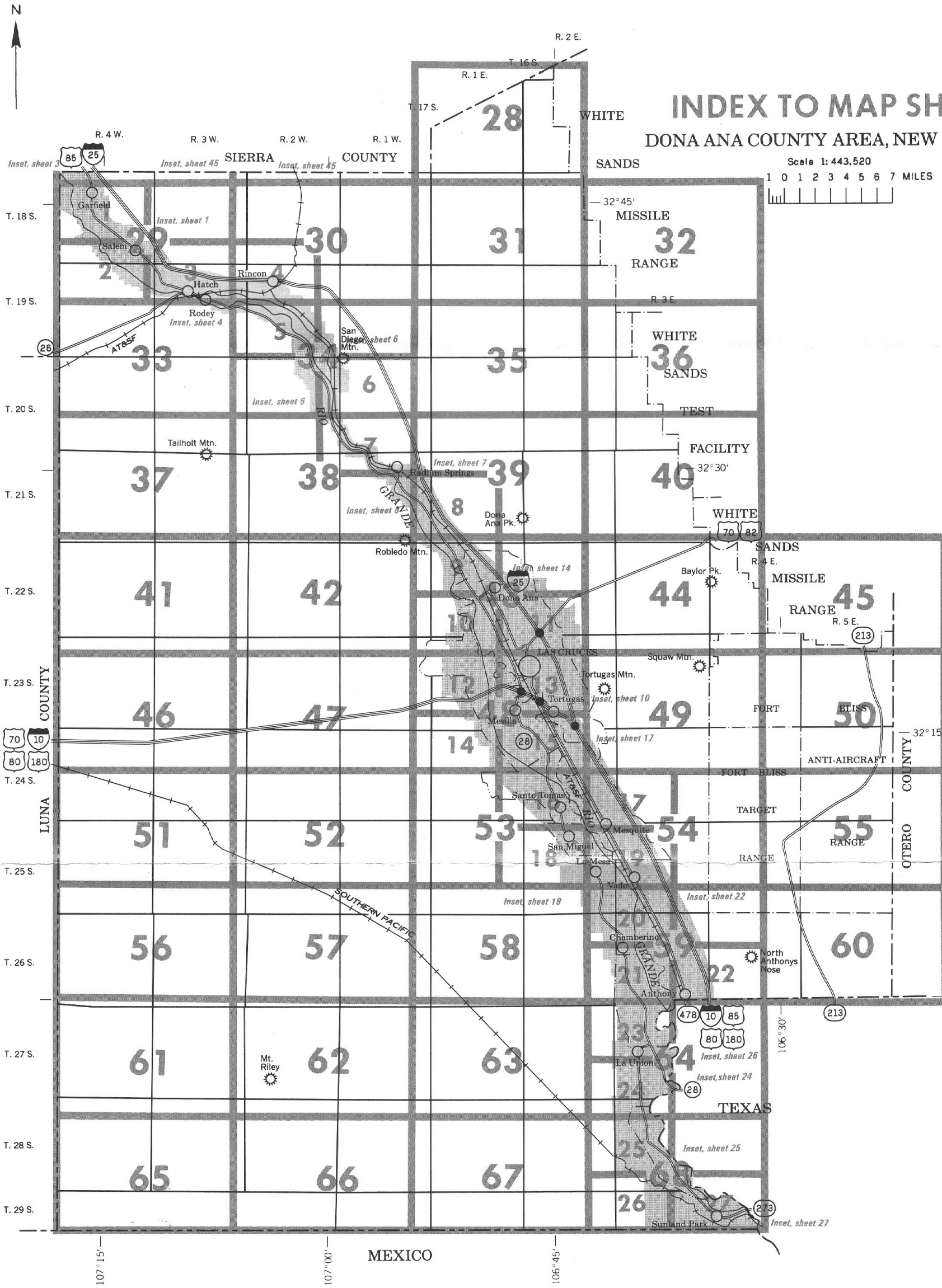
Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

INDEX TO MAP SHEETS

DONA ANA COUNTY AREA, NEW MEXICO

Scale 1: 443,520

1 0 1 2 3 4 5 6 7 MILES



Area mapped at scale of 1:24,000

Area mapped at scale of 1:48,000

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

SOIL LEGEND

The first letter, always a capital, is the intiial letter of the map unit name. The second letter is a capital if the map unit is broadly defined. Otherwise, it is a lower case letter.

SYMBOL	NAME
Ad	Adelino sandy clay loam
Ae	Adelino clay loam
AF	Aftaden-Rock outcrop association
Ag	Agua loam
Ah	Agua clay loam
AJ	Agua Variant soils, moderately wet
AK	Agua Variant and Belen Variant soils
AL	Akela-Rock outcrop complex
AM	Aladdin-Coxwell association
An	Anapra silt loam
Ao	Anapra clay loam
Ap	Anthony-Vinton fine sandy loams
Ar	Anthony-Vinton loams
As	Anthony-Vinton clay loams
At	Armijo loam
Aw	Armijo clay loam
Ax	Armijo clay
Be	Belen loam
Bf	Belen clay loam
Bg	Belen clay
BH	Belen Variant soils
BJ	Berino-Bucklebar association
BK	Berino-Dona Ana association
BL	Berino-Pintura complex
Bm	Bluepoint loamy sand, 1 to 5 percent slopes
Bn	Bluepoint loamy sand, 5 to 15 percent slopes
BO	Bluepoint loamy sand, 1 to 15 percent slopes
BP	Bluepoint-Caliza-Yturbide complex
Br	Brazito loamy fine sand
Bs	Brazito very fine sandy loam, thick surface
CA	Cacique-Cruces association
Cb	Canutio and Arizo gravelly sandy loams
CH	Cave-Harrisburg association
DR	Dona Ana-Reagan association
DS	Dumps
Ge	Glendale loam
Gf	Glendale clay loam
Gg	Glendale clay loam, alkali
HD	Haplargids, dissected
Hf	Harkey fine sandy loam
Hg	Harkey loam
Hh	Harkey loam, saline-alkali
Hk	Harkey clay loam
MN	Masonfort-Nickel association
Mo	Mimbres silty clay loam
MR	Minlith-Rock outcrop association
MS	Motoqua-Rock outcrop association
NB	Nickel-Badland complex
NU	Nickel-Upton association
OP	Onite-Pajarito association
OR	Onite-Pintura complex
Pa	Pajarito fine sandy loam
Pb	Pajarito-Pintura complex
PN	Pinaleno-Nolam association
RE	Riverwash
RF	Riverwash-Arizo complex
RG	Rock outcrop-Argids association
RH	Rock outcrop-Argids, cool, association
RL	Rock outcrop-Lozier association
RT	Rock outcrop-Torriorthents association
SH	Simona-Harrisburg association
ST	Stellar association
TE	Tencee-Upton association
TF	Terino-Casito association
Vf	Vinton Variant fine sandy loam
Vg	Vinton Variant sandy clay loam
WH	Wink-Harrisburg association
WP	Wink-Pintura complex

CULTURAL FEATURES

BOUNDARIES

- National, state or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline & neatline

AD HOC BOUNDARY (label)

- Small airport, airfield, park, oilfield, cemetery, or flood pool (Davis Airstrip; FLOOD POOL LINE)

STATE COORDINATE TICK

LAND DIVISION CORNERS (sections and land grants)

ROADS

- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEMS & DESIGNATIONS

- Interstate (79)
- Federal (410)
- State (52)
- County, farm or ranch (378)

RAILROAD

POWER TRANSMISSION LINE (normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES

- Without road
- With road
- With railroad

DAMS

- Large (to scale)
- Medium or small (water; w)

PITS

- Gravel pit (G.P.)
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban areas)
- Church
- School
- Indian mound (label) (Indian Mound; Tower)
- Located object (label)
- Tank (label) (GAS)
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end

Canals or ditches

- Double-line (label) (CANAL)
- Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

- Perennial (water; w)
- Intermittent (int; i)

MISCELLANEOUS WATER FEATURES

- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS (SvE 107)

ESCARPMENTS

- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

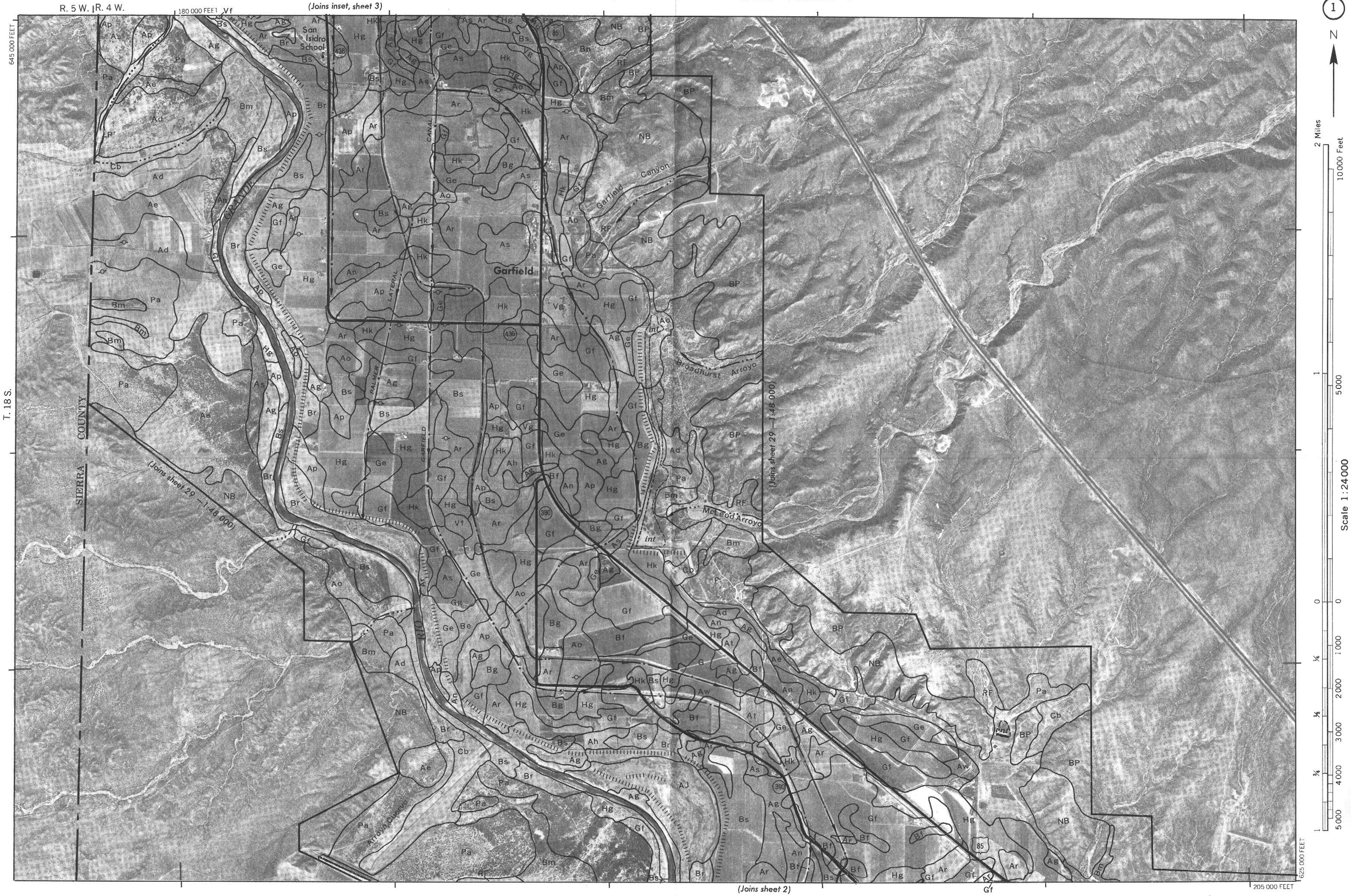
GULLY

DEPRESSION OR SINK

SOIL SAMPLE SITE (normally not shown)

MISCELLANEOUS

- Blowout
- Clay spot
- Gravelly spot
- Gumbo, slick or scabby spot (sodic)
- Dumps and other similar non soil areas
- Prominent hill or peak
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip (tips point upslope)
- Stony spot, very stony spot

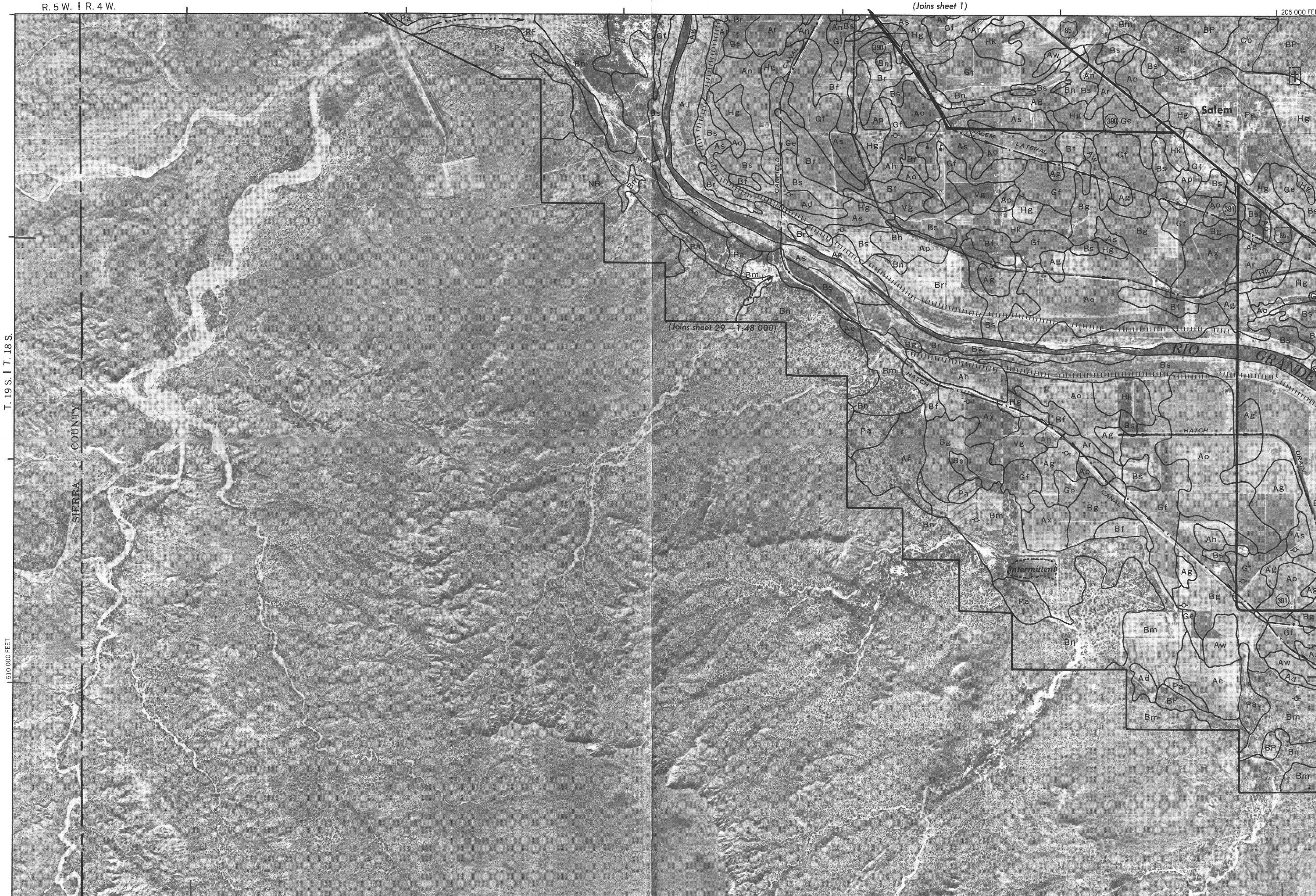


DONA ANA COUNTY AREA, NEW MEXICO NO. 1

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

2

DONA ANA COUNTY AREA, NEW MEXICO — SHEET NUMBER 2



N

Scale 1:24000

2 Miles

10000 Feet

1 5000

0 0

¼ 1000

2000

½ 3000

4000

¾ 5000

1

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DONA ANA COUNTY AREA, NEW MEXICO NO. 2

DONA ANA COUNTY AREA, NEW MEXICO — SHEET NUMBER 3

DONA ANA COUNTY AREA, NEW MEXICO NO. 3

This map is compiled on 1974 aerial photography for the U. S. Department of Agriculture, Soil Conservation Service cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

INSET

R. 5 W. | R. 4 W.

180 000 FEET

650 000 FEET

SIERRA COUNTY

T. 18 S.

645 000 FEET

190 000 FEET

(Joins sheet 1)

(Joins inset A, sheet 4) — 1:48 000)

4000 AND 5000-FOOT GRID TICKS

210 000 FEET

625 000 FEET

(Joins sheet 2)

(Joins sheet 29 — 1:48 000)

T. 19 S. | T. 18 S.

(Joins sheet 4)

R. 4 W. | R. 3 W.

(Joins inset, sheet 4)

235 000 FEET

605 000 FEET

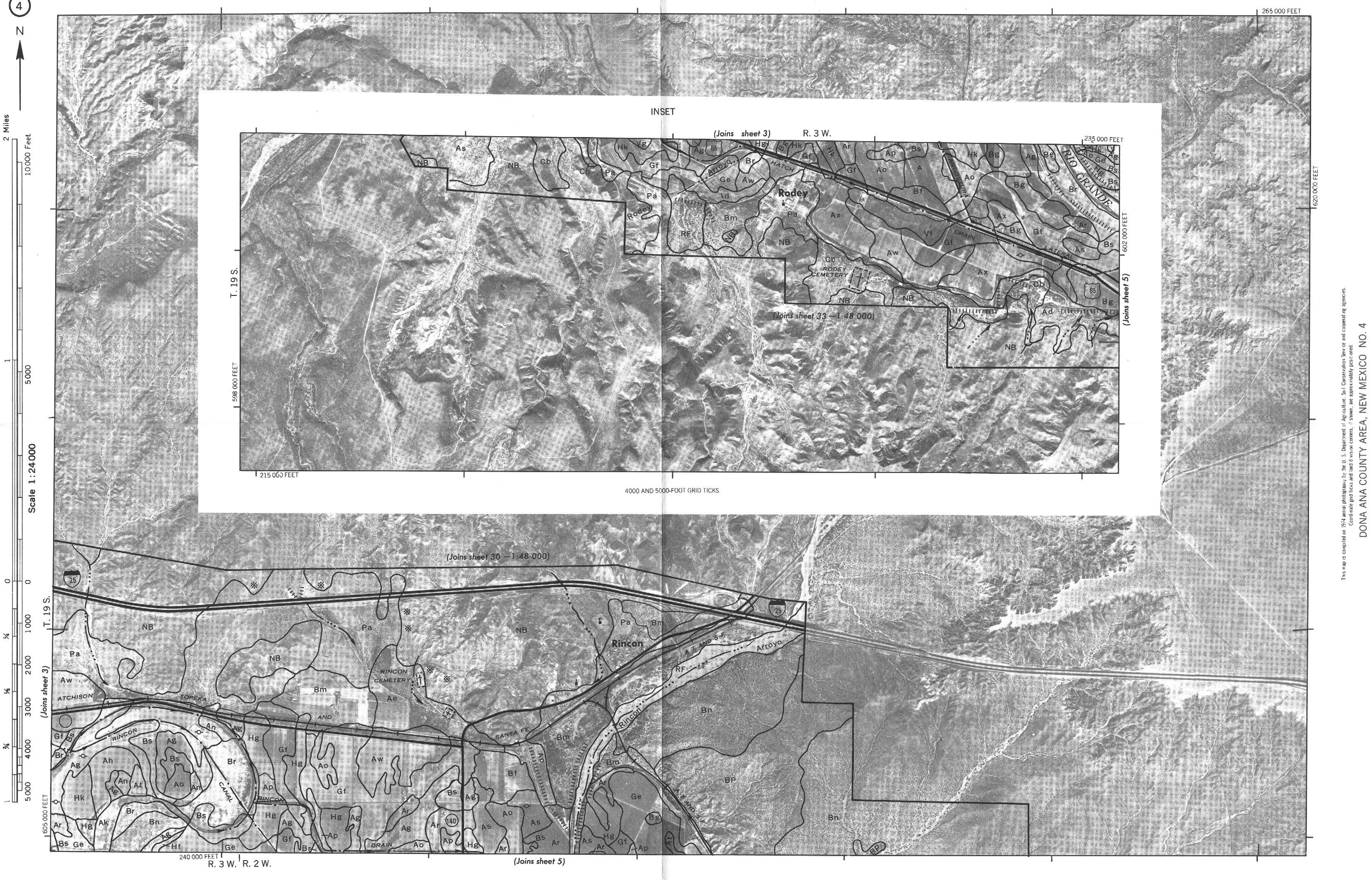
3

N

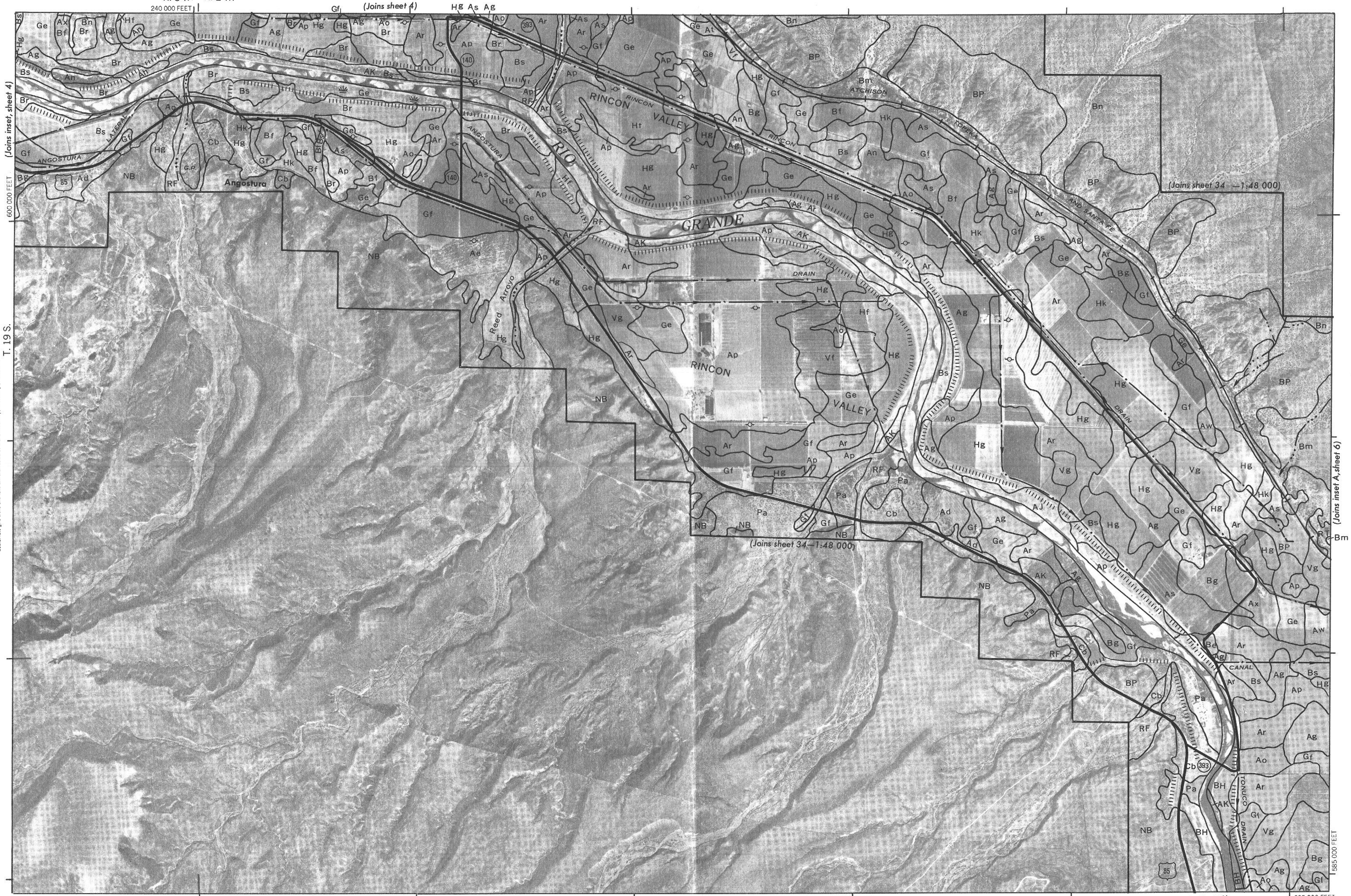
2 Miles

10000 Feet

Scale 1:24 000


4
N
2 Miles
1
0
10 000 Feet
5000
0
Scale 1:24 000
INSET
(Joins sheet 3)
R. 3 W.
235 000 FEET
T. 19 S.
Rodey
RODEY CEMETERY
RIO GRANDE
HATCH
DRAIN
LATERAL
Arroyo
602 000 FEET
598 000 FEET
(Joins sheet 5)
(Joins sheet 33 — 1:48 000)
215 000 FEET
4000 AND 5000-FOOT GRID TICKS
265 000 FEET
620 000 FEET
(Joins sheet 30 — 1:48 000)
T. 19 S.
Rincon
RINCON CEMETERY
ATCHISON
TOPEKA
AND
SANTA FE
RINCON
CANAL
DRAIN
A. T. AND S. F.
Rincon
Arroyo
(Joins sheet 3)
605 000 FEET
240 000 FEET
R. 3 W.
R. 2 W.
(Joins sheet 5)
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.
DONA ANA COUNTY AREA, NEW MEXICO NO. 4

5



N

2 Miles

10 000 Feet

Scale 1:24000

DONA ANA COUNTY AREA, NEW MEXICO NO. 5

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

6

N

2 Miles

10000 Feet

Scale 1:24000

R. 2 W. (Joins inset A)

T. 20 S. | T. 19 S.

(Joins inset B)

(Joins sheet 34 — 1:48 000)

(Joins sheet 7)

565 000 FEET

270 000 FEET

INSET A

R. 2 W.

272 000 FEET

600 000 FEET

(Joins sheet 5)

(Joins sheet 34 — 1:48 000)

T. 19 S.

585 000 FEET

(Joins upper left)

268 000 FEET

4000 AND 5000-FOOT GRID TICKS

295 000 FEET

580 000 FEET

INSET B

(Joins sheet 5)

R. 2 W.

265 000 FEET

T. 20 S. | T. 19 S.

(Joins sheet 34 — 1:48 000)

580 000 FEET

(Joins upper left)

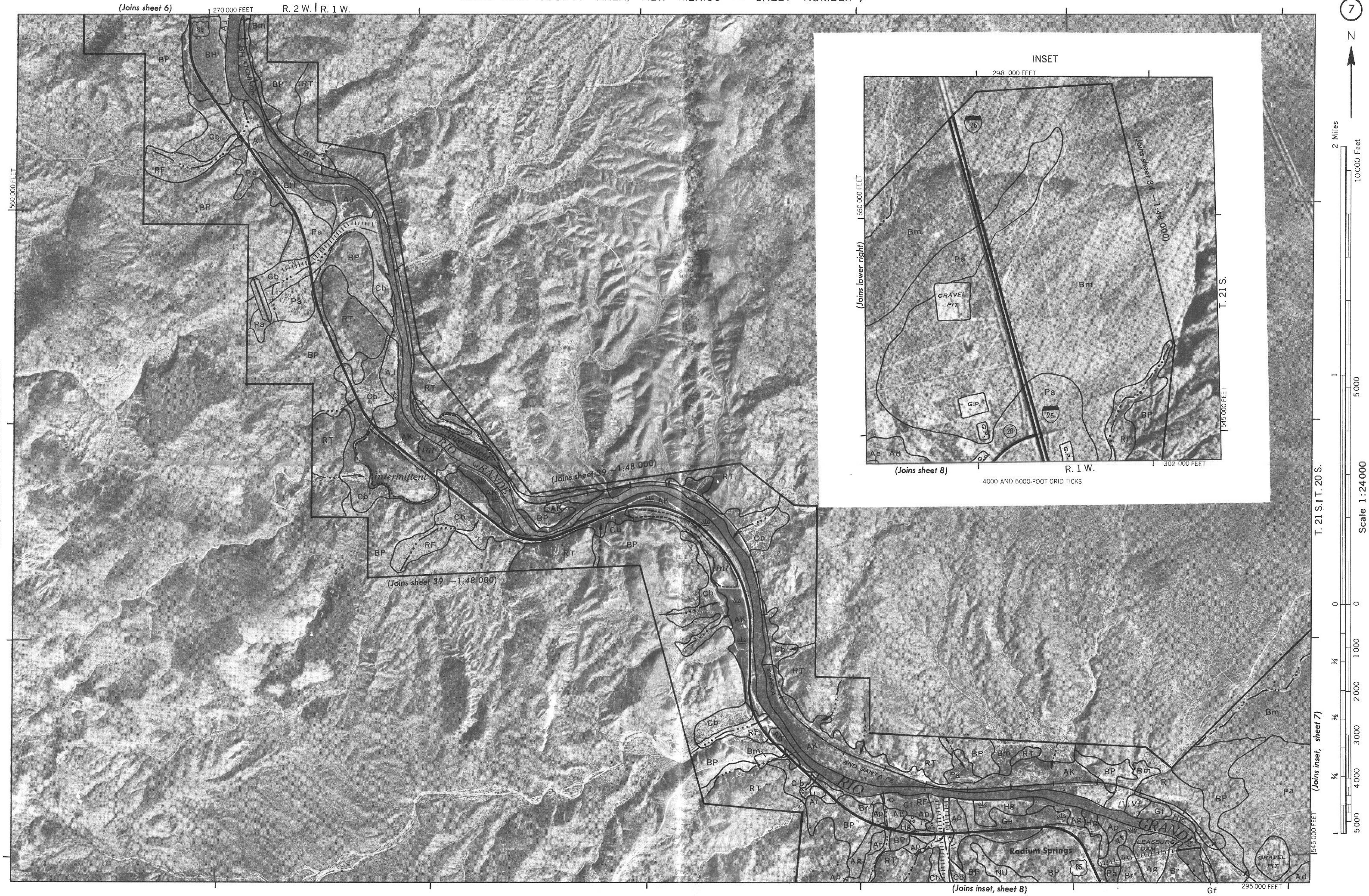
575 000 FEET

261 000 FEET

4000 AND 5000-FOOT GRID TICKS

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and grid division corners, if shown, are approximately positioned.

DONA ANA COUNTY AREA, NEW MEXICO NO. 6



DONA ANA COUNTY AREA, NEW MEXICO NO. 7

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

8

N

2 Miles 10000 Feet

1 5000

Scale 1:24000

0 0 1000 2000 3000 4000 5000 FEET

(Joins inset, sheet 7)

(Joins inset)

(Joins sheet 39 — 1:48 000)

(Joins sheet 9)

(Joins sheet 7)

(Joins sheet 38 — 1:48 000)

(Joins upper left)

320 000 FEET

295 000 FEET

285 000 FEET

540 000 FEET

535 000 FEET

525 000 FEET

300 000 FEET

T. 21 S.

R. 1 W. | R. 1 E.

R. 1 W.

ATCHISON, TOPEKA AND SANTA FE

SANTA FE

LEASBURG

GRAVEL PIT

CANAL

AMERICAN BEND LATERAL

Wagner Canyon

Cholla Canyon

Leasburg

RIO GRANDE

This map is compiled on 1972 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DONA ANA COUNTY AREA, NEW MEXICO NO. 8

DONA ANA COUNTY AREA, NEW MEXICO NO. 9

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

2 Miles

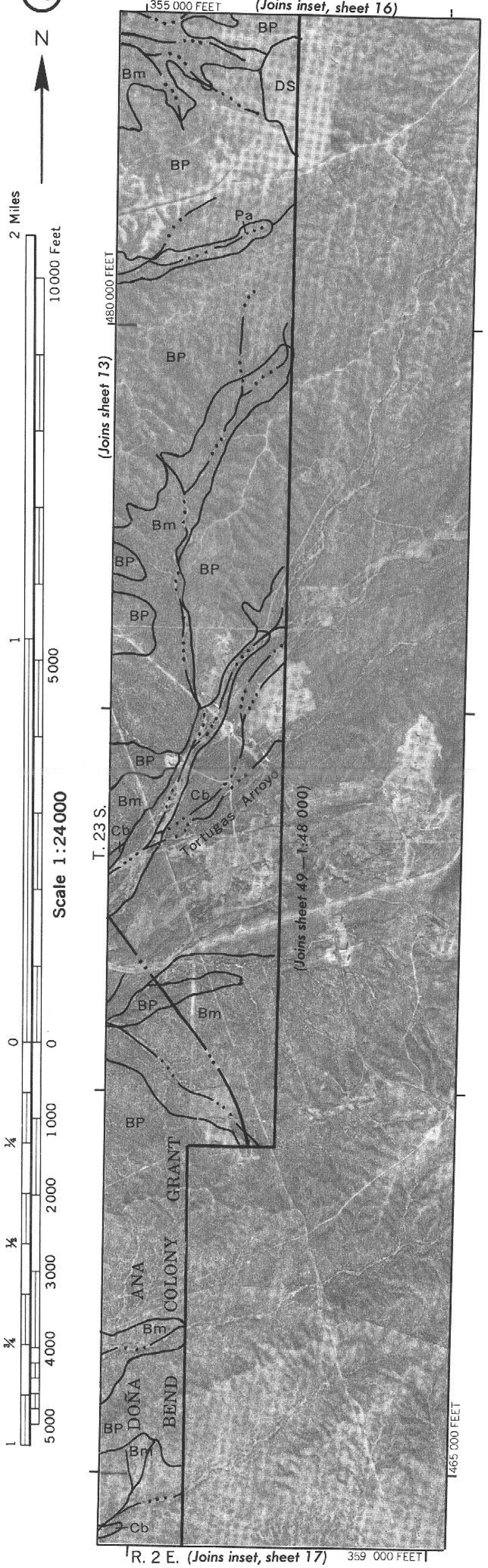
10 000 Feet

Scale 1:24 000

DONA ANA COUNTY AREA, NEW MEXICO — SHEET NUMBER 10

(10)

INSET

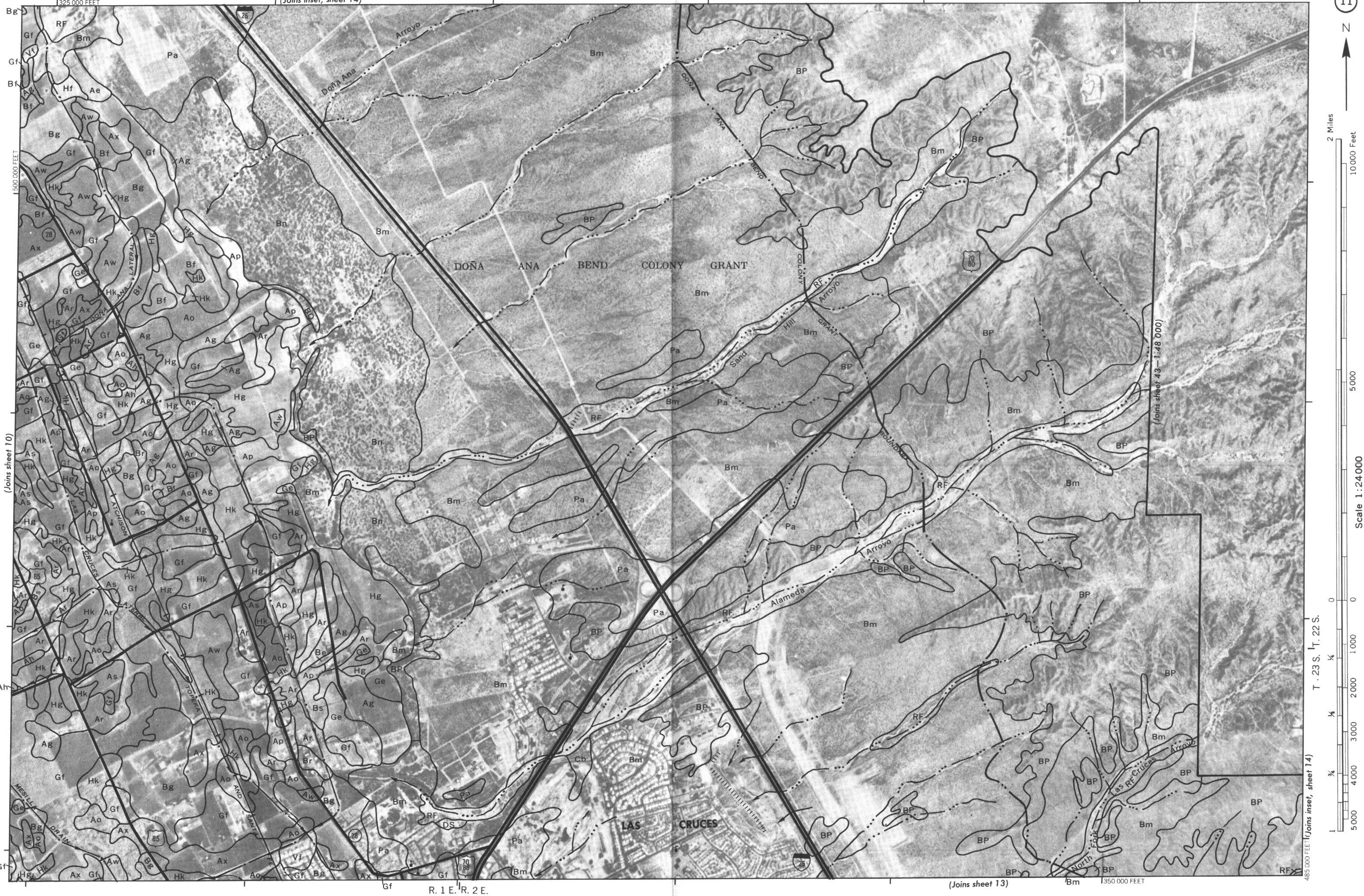


This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DONA ANA COUNTY AREA, NEW MEXICO NO. 10

DONA ANA COUNTY AREA, NEW MEXICO NO. 11

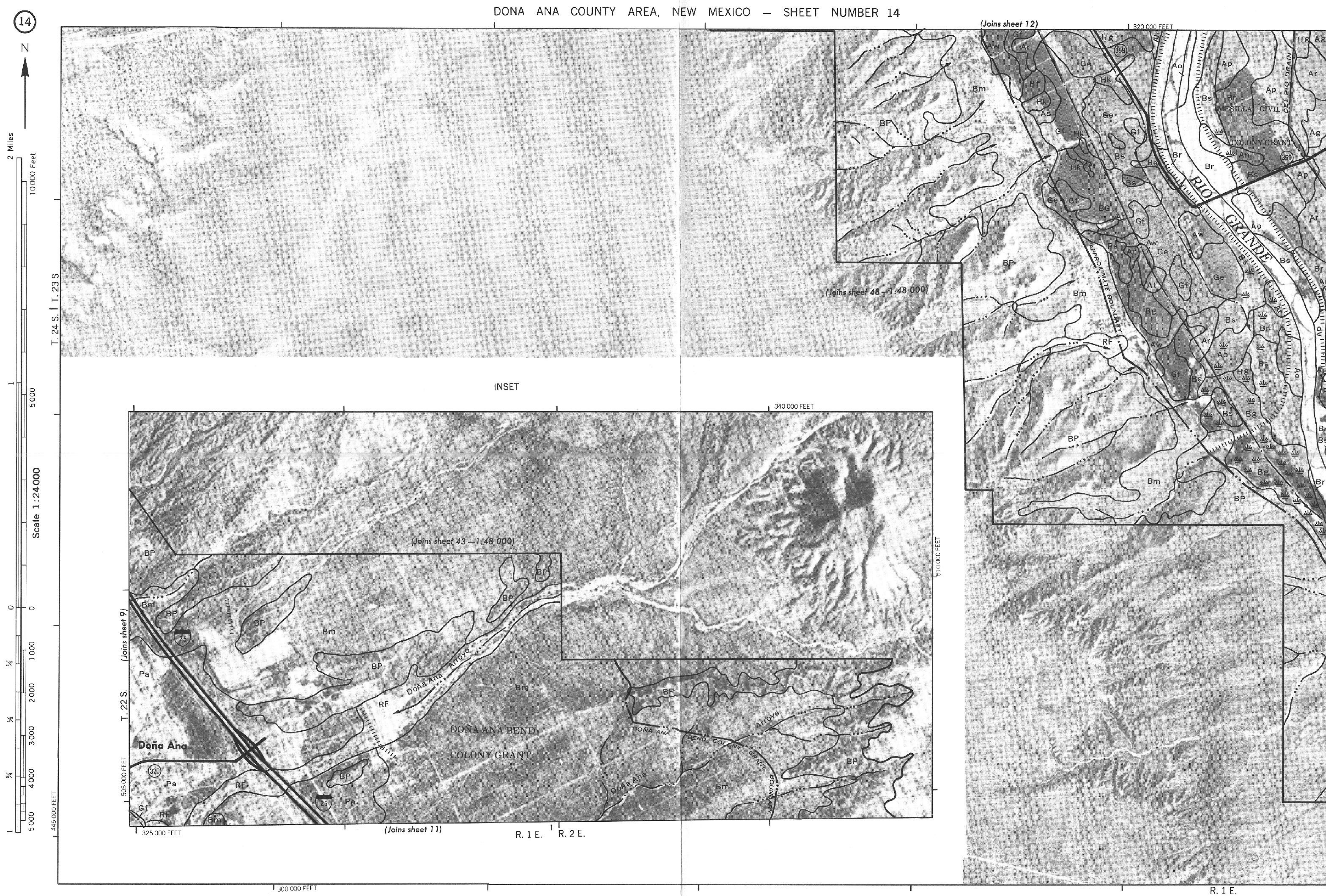
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DONA ANA COUNTY AREA, NEW MEXICO NO. 13

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

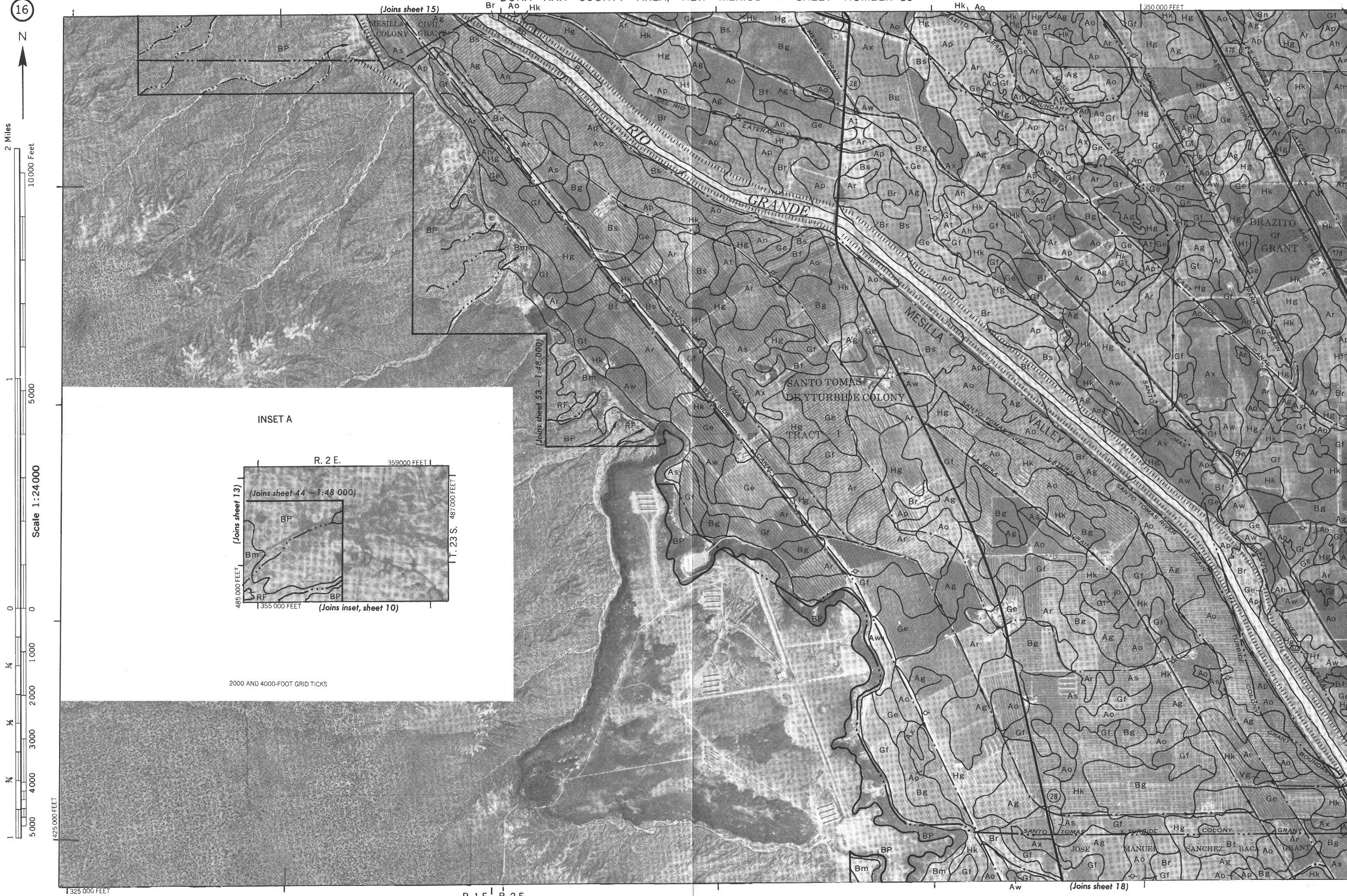
DONA ANA COUNTY AREA, NEW MEXICO NO. 14

DONA ANA COUNTY AREA, NEW MEXICO — SHEET NUMBER 15

DONA ANA COUNTY AREA, NEW MEXICO NO. 15

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DONA ANA COUNTY AREA, NEW MEXICO — SHEET NUMBER 16



This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DONA ANA COUNTY AREA, NEW MEXICO NO. 16

DONA ANA COUNTY AREA, NEW MEXICO — SHEET NUMBER 17

DONA ANA COUNTY AREA, NEW MEXICO NO. 17

This map is compiled on 1972 aerial photography by the U. S. Department of Agriculture Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

355 000 FEET

440 000 FEET

(Joins lower right)

(Joins sheet 16)

(Joins sheet 54 — 1:48 000)

BRAZITO GRANT BOUNDARY DRAIN

BRAZITO

GRANT

MESILLA VALLEY

RIO GRANDE

T. 25 S. | T. 24 S.

(Joins sheet 19)

R. 2 E. R. 3 E.

375 000 FEET

425 000 FEET

INSET

356000 FEET

460 000 FEET

(Joins inset, sheet 10)

T. 24 S. | T. 23 S.

(Joins sheet 15)

(Joins sheet 49 — 1:48 000)

(Joins upper left) R. 2 E

360 000 FEET

445 000 FEET

17

N

Scale 1:24000

2 Miles

10000 Feet

5000

0

1 000

2 000

3 000

4 000

5 000

18

N

2 Miles

10 000 Feet

Scale 1:24000

1 5000 ¾ 4000 ½ 3000 ¼ 2000 0 1000 0

405 000 FEET

325 000 FEET

INSET

(Joins lower right)

R. 2 E.

354 000 FEET

405 000 FEET

T. 25 S.

(Joins sheet 58 — 1:48 000)

(Joins sheet 20)

337 000 FEET

353 000 FEET

1000 AND 3000-FOOT GRID TICKS

(Joins sheet 16)

350 000 FEET

420 000 FEET

T. 25 S.

(Joins sheet 53 — 1:48 000)

San Miguel St. Michael Church

JOSE MANUEL SANCHEZ WEST BACA GRANT SAN MIGUEL LA MESA DRAIN AVE

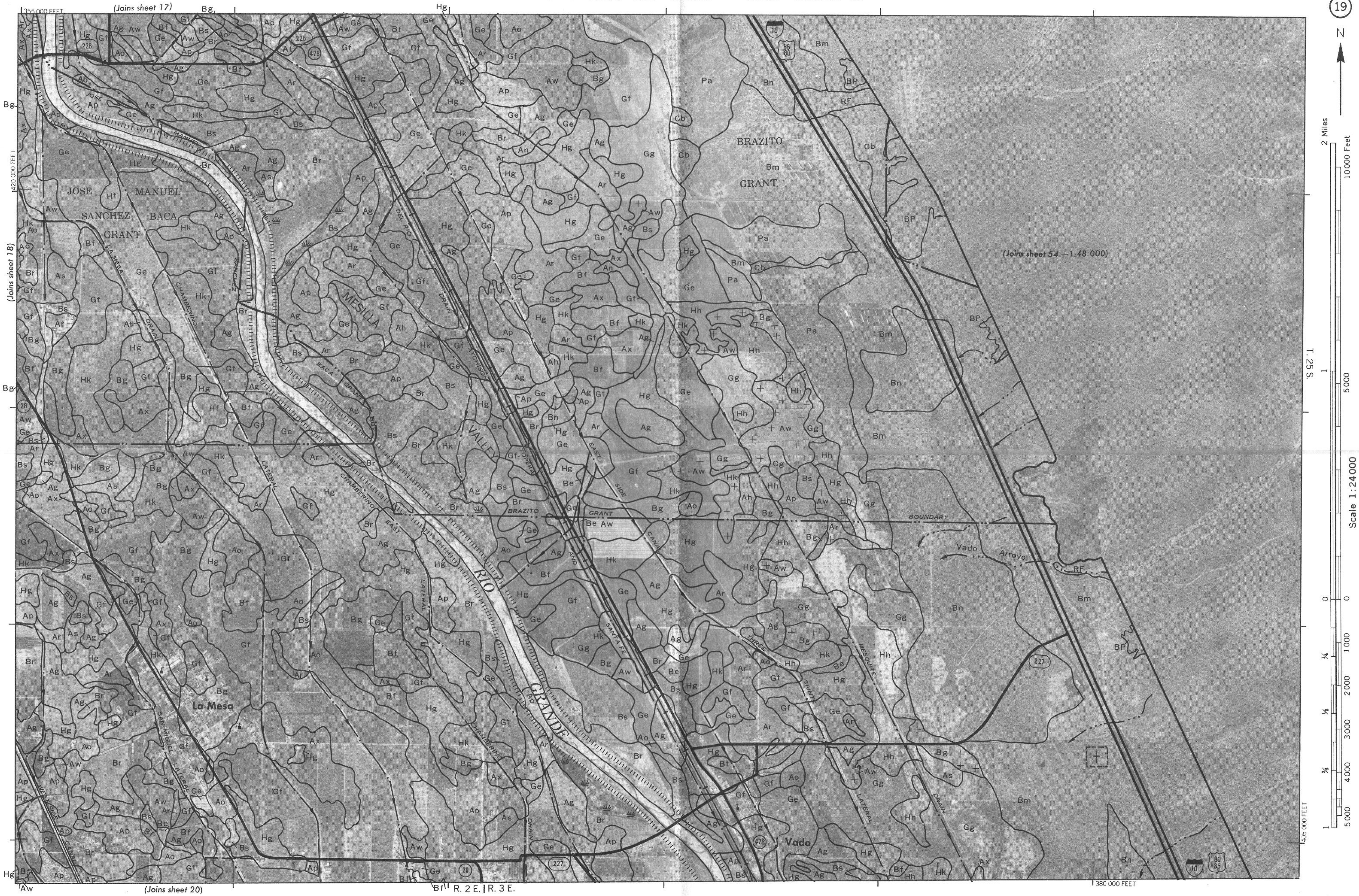
(Joins sheet 19)

R. 2 E. (Joins inset)

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DONA ANA COUNTY AREA, NEW MEXICO NO. 18

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



DONA ANA COUNTY AREA, NEW MEXICO — SHEET NUMBER 20

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DONA ANA COUNTY AREA, NEW MEXICO NO. 20

21

N

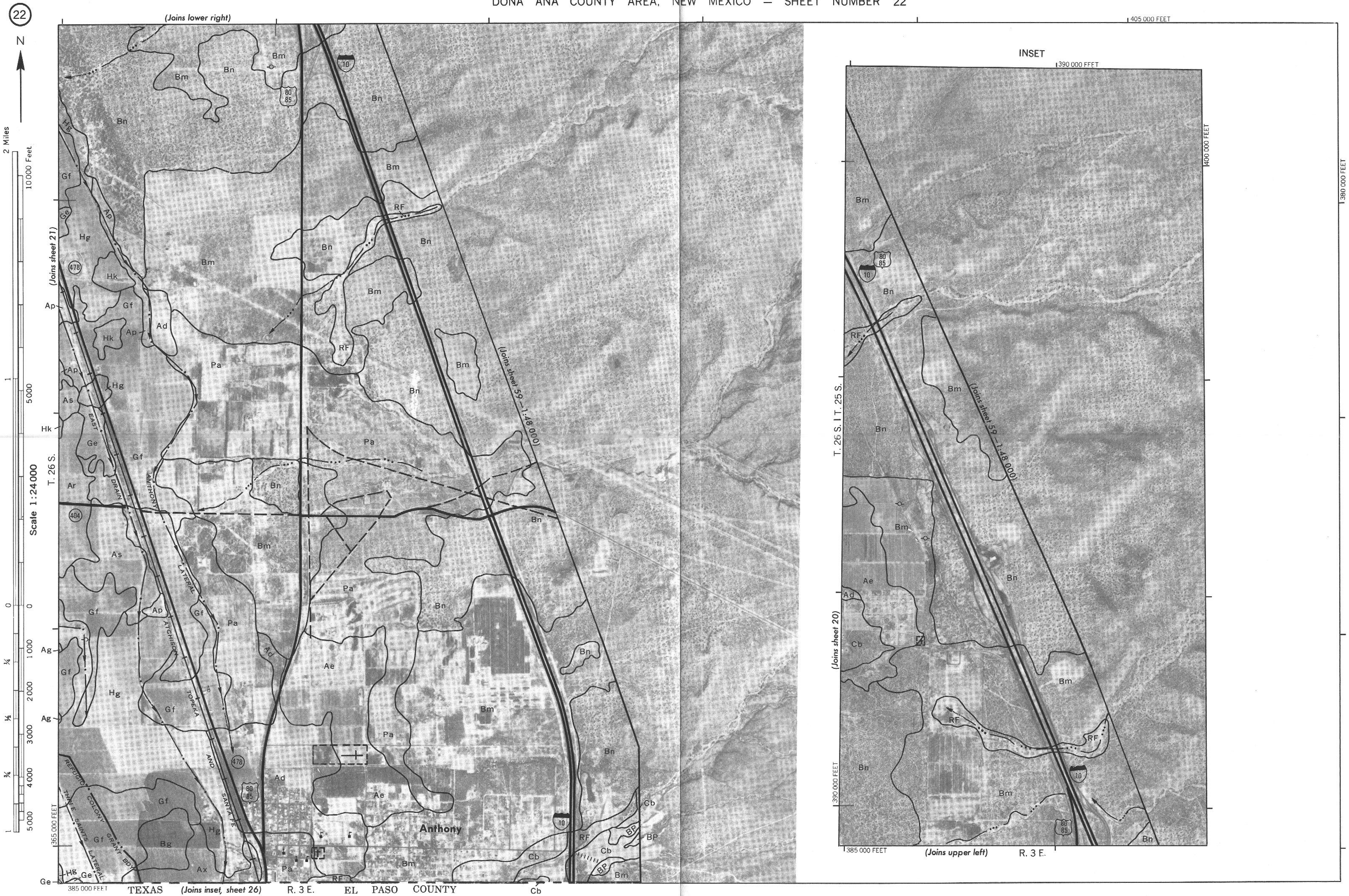
2 Miles

10 000 Feet

Scale 1:24 000

DONA ANA COUNTY AREA, NEW MEXICO NO. 21

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

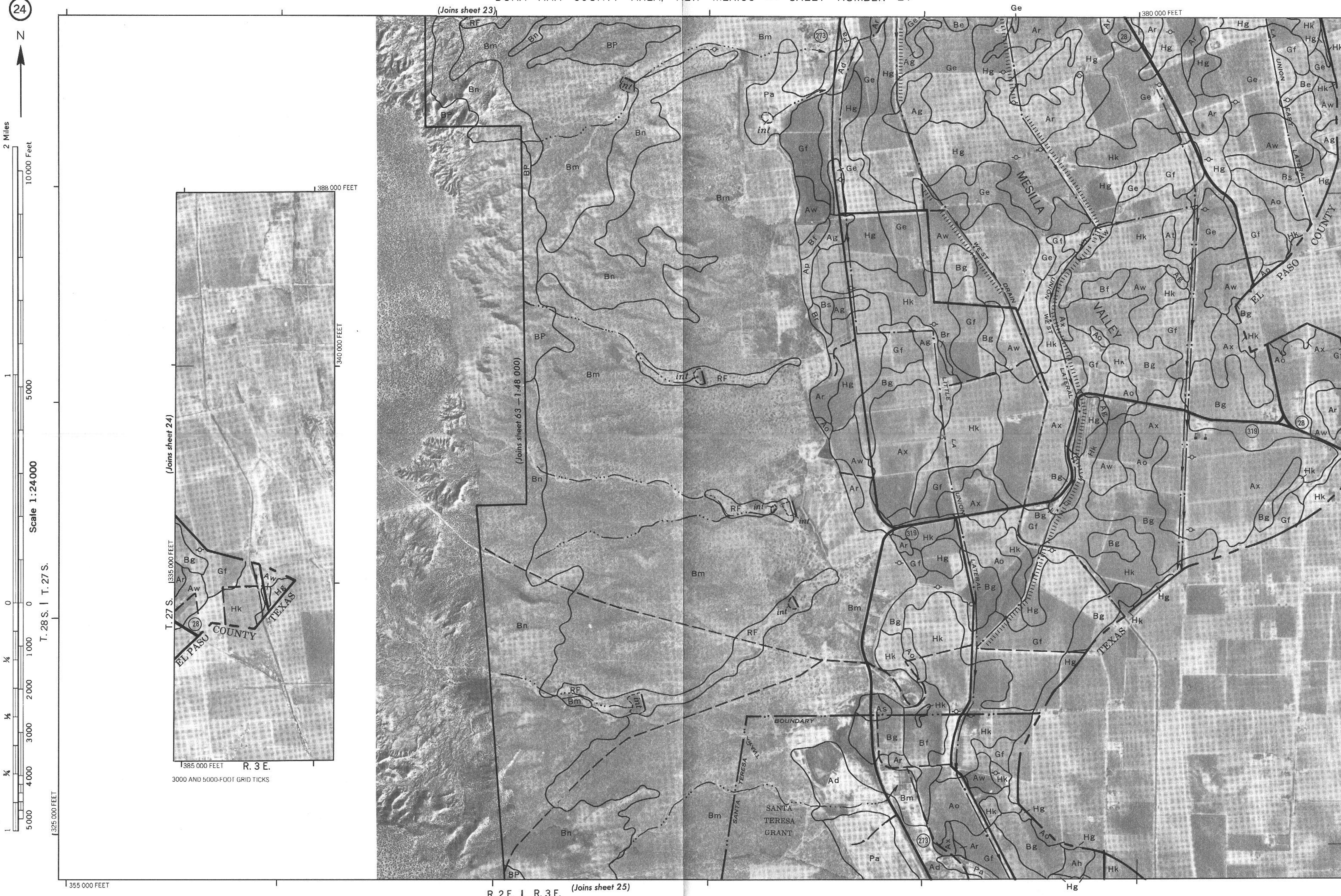


This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DONA ANA COUNTY AREA, NEW MEXICO NO. 22

DONA ANA COUNTY AREA, NEW MEXICO NO. 23

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



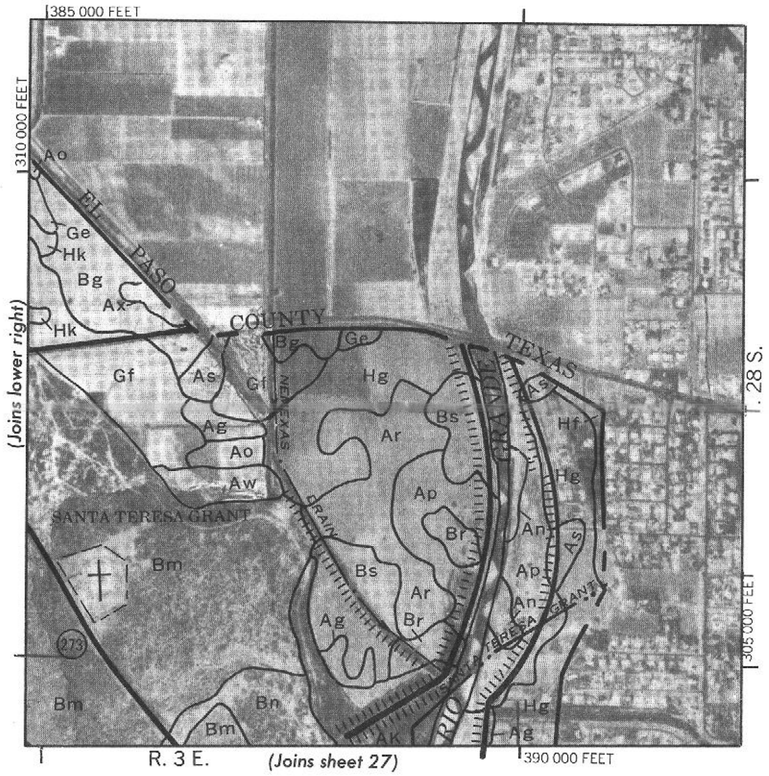
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

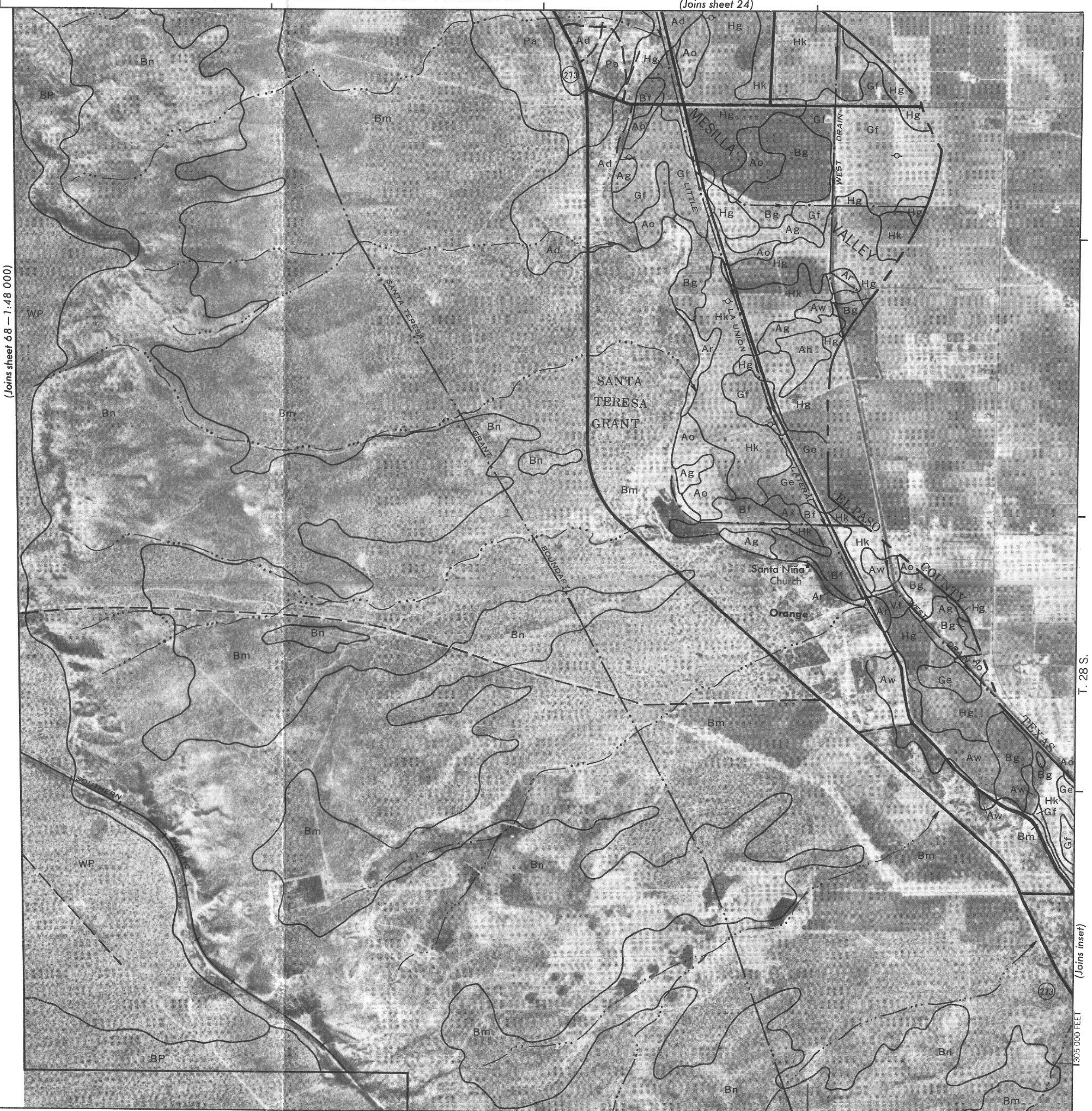
DONA ANA COUNTY AREA, NEW MEXICO NO. 24

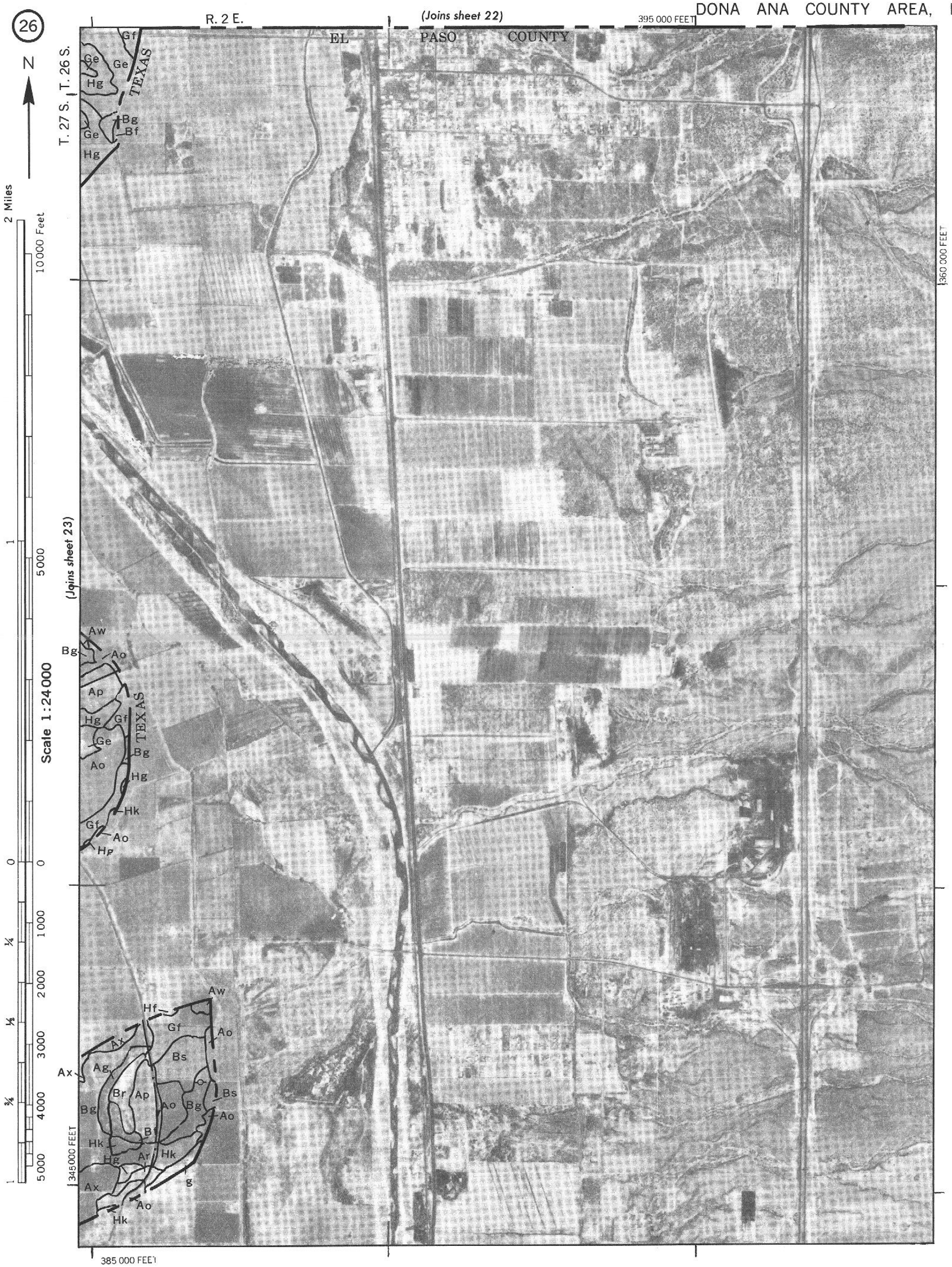
DONA ANA COUNTY AREA, NEW MEXICO NO. 25

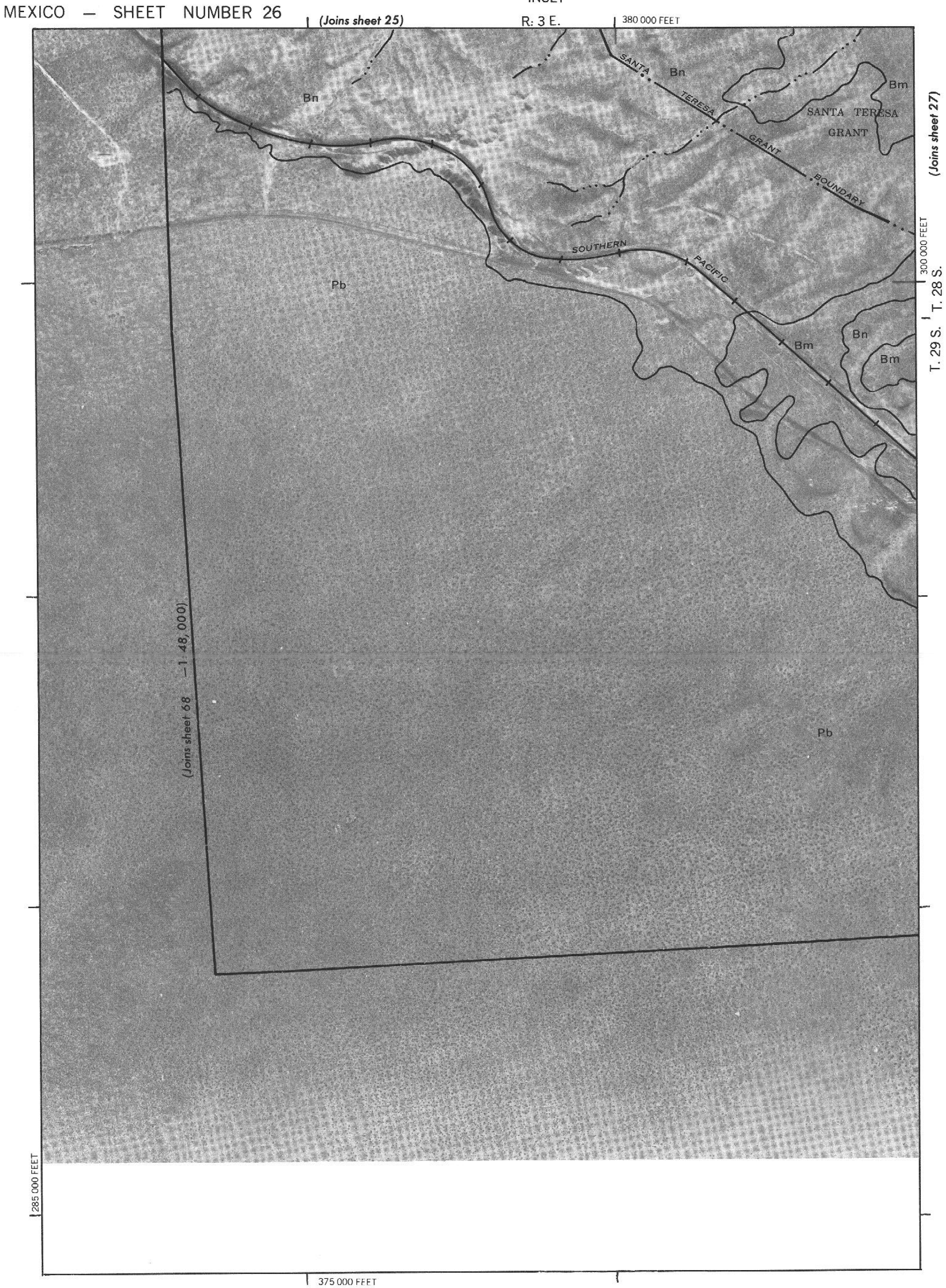
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately [illegible].

INSET A





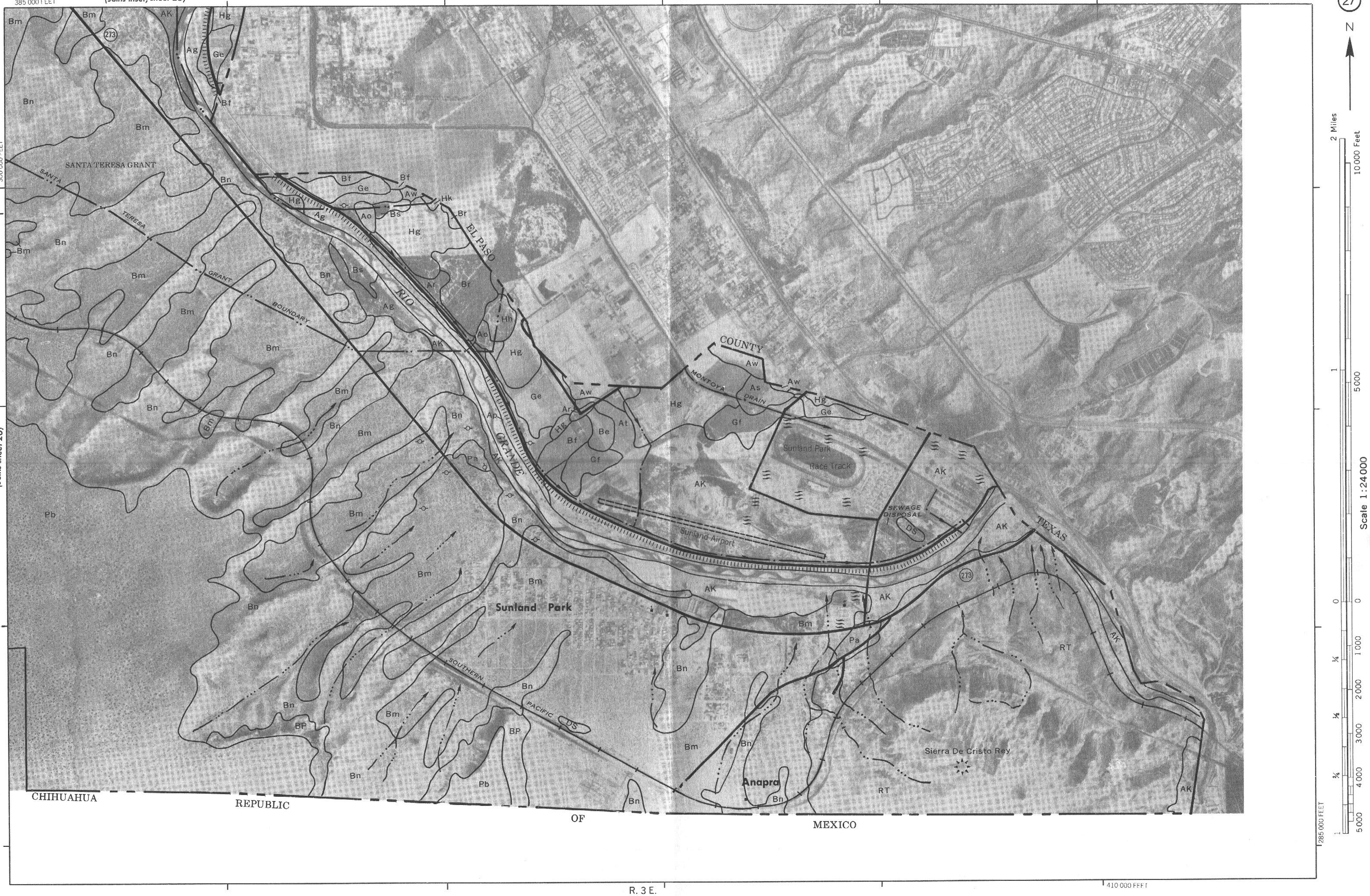




This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DONA ANA COUNTY AREA, NEW MEXICO NO. 26

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



28

N

Scale 1:48 000

4 Miles 2 0 20000 Feet 10 000 0

2 1 0 2000 4000 6000 8000 10000

650 000 FEET

350 000 FEET

680 000 FEET

T. 17 S. | T. 16 S.

T. 18 S. | T. 17 S.

300 000 FEET

R. 1 W. | R. 1 E.

R. 1 E. | R. 2 E.

SIERRA COUNTY

WHITE SANDS MISSILE RANGE

BOUNDARY OF SOIL SURVEY

LIMIT

RESERVATION

MILITARY

Draw

Fleck

FLAT LAKE

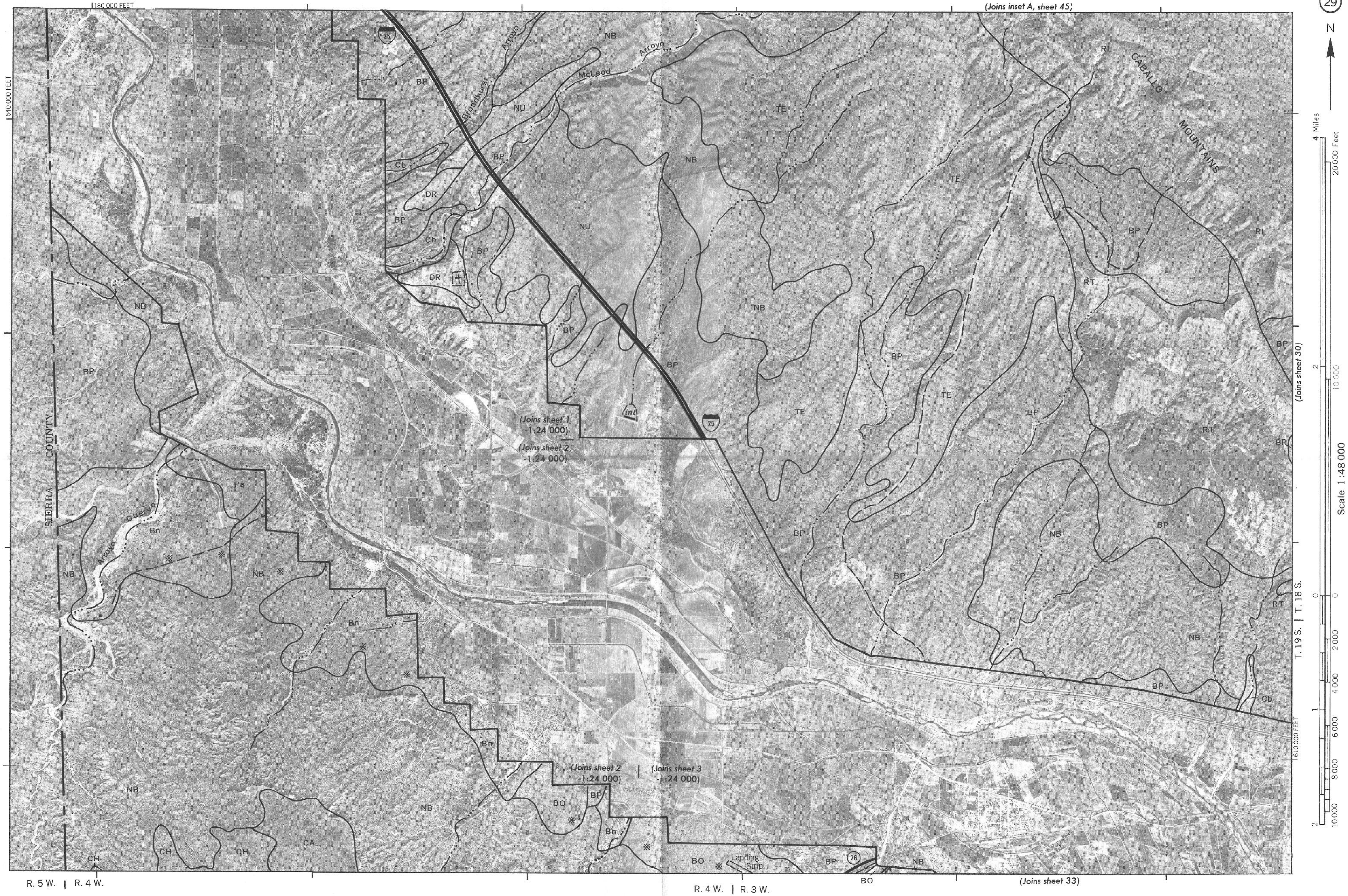
BL SH Mo NU DR OR BK OP ST

(Joins inset, sh 45)

(Joins sheet 31)

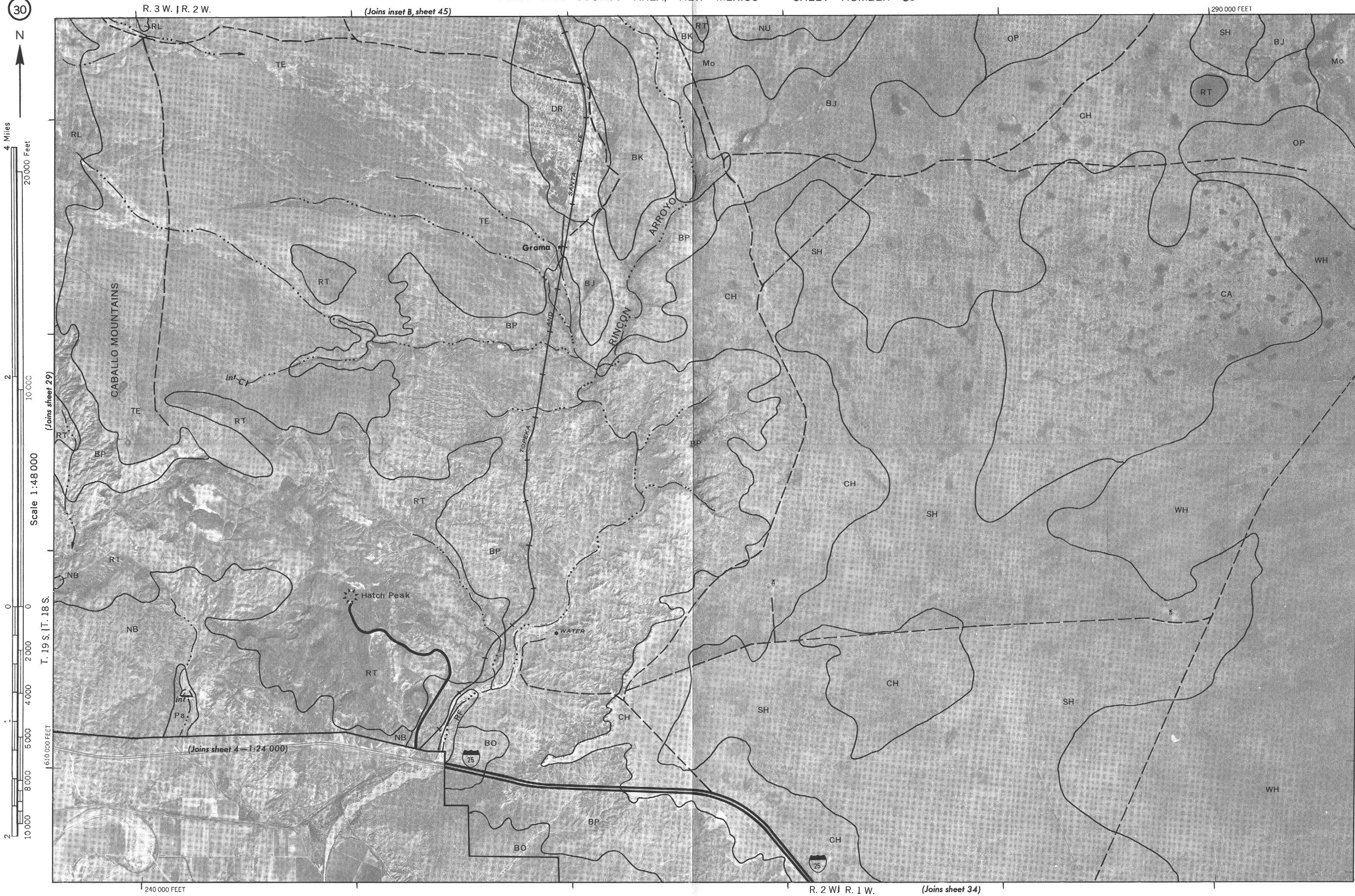
This map is compiled on 1974 aerial photographs by the U. S. Department of Agriculture Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DONA ANA COUNTY AREA, NEW MEXICO NO. 28



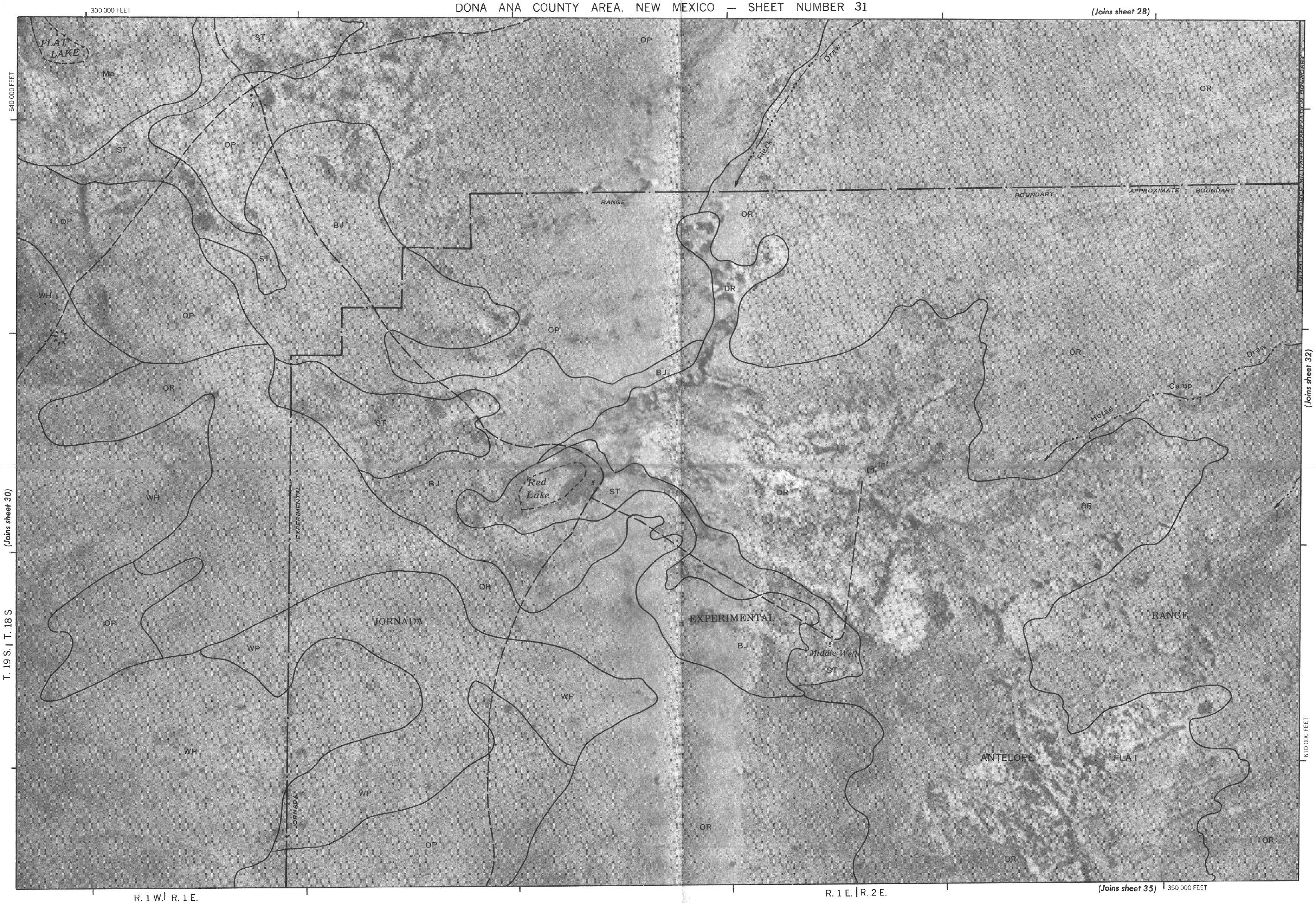
DONA ANA COUNTY AREA, NEW MEXICO NO. 29

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DONA ANA COUNTY AREA, NEW MEXICO NO. 30



31

N

4 Miles
2
0
2
20 000 Feet
10 000
0
2000
4000
6000
8000
10 000

Scale 1:48 000

DONA ANA COUNTY AREA, NEW MEXICO NO. 31

This map is compiled on 197- aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

32

N

Scale 1:48 000

4 Miles 2 0

20000 Feet 10 000 0

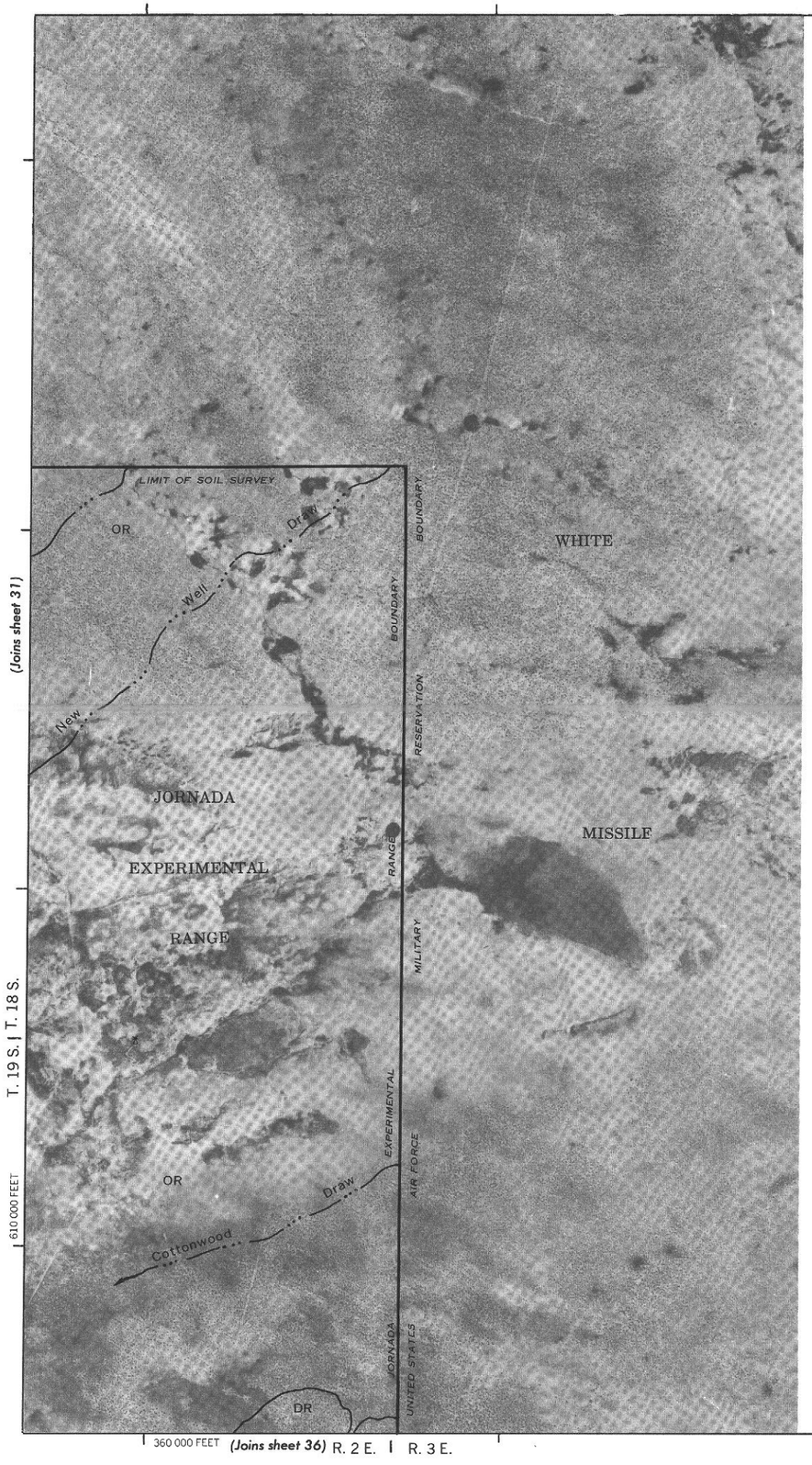
10 000 8 000 6 000 4 000 2 000 0

410 000 FEET

640 000 FEET

610 000 FEET

360 000 FEET



(Joins sheet 31)

T. 19 S. | T. 18 S.

(Joins sheet 36) R. 2 E. | R. 3 E.

RANGE

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and and division corners, if shown, are approximately positioned.

DONA ANA COUNTY AREA, NEW MEXICO NO. 32

DONA ANA COUNTY AREA, NEW MEXICO — SHEET NUMBER 33

33

R. 5 W. | R. 4 W.

180 000 FEET

600 000 FEET

(Joins sheet 29)

(Joins inset, sheet 4 - 1:24 000)

(Joins sheet 34)

(Joins sheet 37)

230 000 FEET

570 000 FEET

R. 4 W. | R. 3 W.

T. 20 S. | T. 19 S.

N

4 Miles

20 000 Feet

10 000

8 000

Scale 1:48 000

SIERRA COUNTY

LUNA COUNTY

SIERRA DE LAS UVAS

Landing Strip

Plagitas Arroyo

SANTA FE AND TOPEKA ATCHISON

Souse Spring

Blanco Tank

Peloncito Peak

Las Uvas Spring

Horse Canyon

int

CA

CH

DR

NB

BO

BP

NU

TE

RG

MS

Mo

BK

DONA ANA COUNTY AREA, NEW MEXICO NO. 33

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DONA ANA COUNTY AREA, NEW MEXICO — SHEET NUMBER 34

N

(Joins sheet 30)

(Joins sheet 33)

(Joins sheet 35)

(Joins sheet 38)

T. 20 S. | T. 19 S.

R. 3 W. | R. 2 W.

R. 2 W. | R. 1 W.

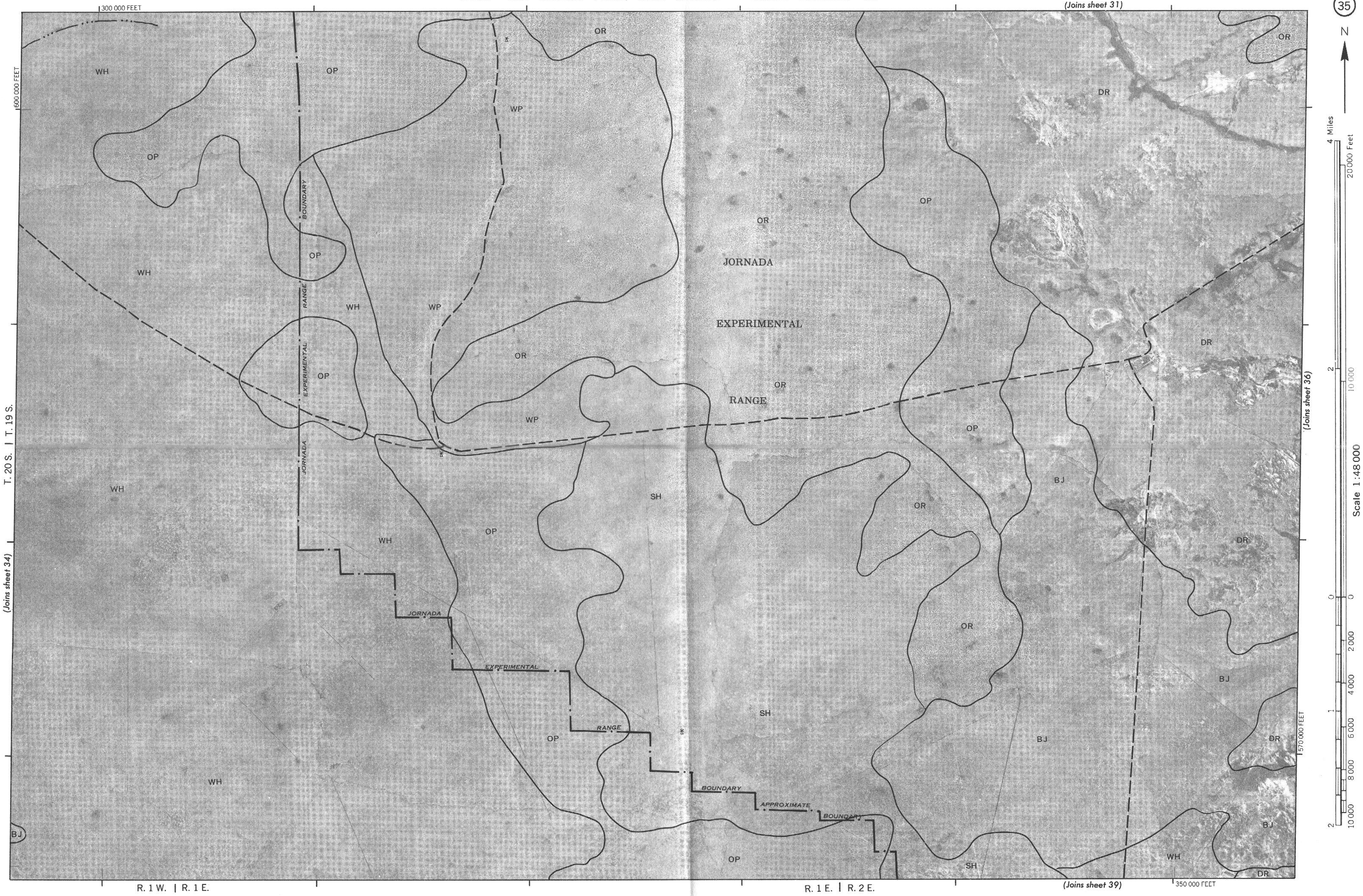
Scale 1:48 000

4 Miles, 2, 1, 0, 2

20 000 Feet, 10 000, 0, 2000, 4000, 6000, 8000, 10 000

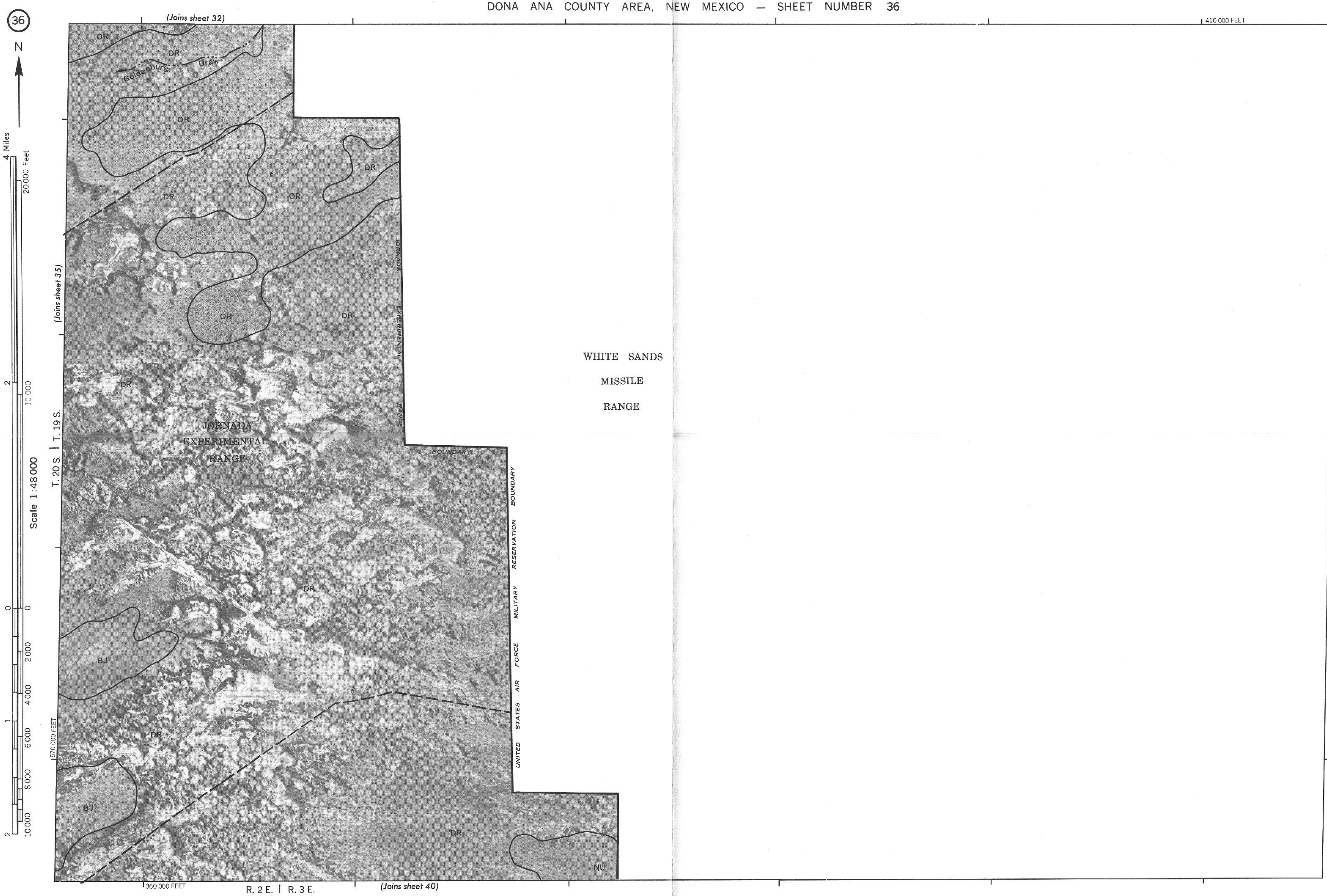
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DONA ANA COUNTY AREA, NEW MEXICO NO. 34



DONA ANA COUNTY AREA, NEW MEXICO NO. 35

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DONA ANA COUNTY AREA, NEW MEXICO NO. 36

DONA ANA COUNTY AREA, NEW MEXICO — SHEET NUMBER 37

DONA ANA COUNTY AREA, NEW MEXICO NO. 37

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

180 000 FEET

560 000 FEET

(Joins sheet 33)

(Joins sheet 38)

(Joins sheet 41)

230 000 FEET

530 000 FEET

37

N

Scale 1:48 000

4 Miles

20 000 Feet

10 000

T. 21 S. | T. 20 S.

R. 5 W. | R. 4 W.

R. 4 W. | R. 3 W.

LUNA COUNTY

SIERRA DE LAS UVAS

Rattlesnake Tank

Green Tree Tank

Pine Canyon

Lone Tree Tank

New Tank

Twin Hills Tank

The Saddle Mountain

Miguel Tanks

Horse Canyon

White Gap

Draw

Broad Canyon

Kerr Canyon

Choases Canyon

Valles Canyon

Choases Tank

Kerr Tank

Sugarloaf Peak

Tailholt Mountain

Magdalena Peak

Silva Tank

Tojanio Pinto Tank

Upper Swope Tank

East Tank

Mo NU BK RG MS MN NB TE ST RT

(38)

N

Scale 1:48 000

4 Miles | 2 | 1 | 0 | 2

20 000 Feet | 10 000 | 0 | 2000 | 4000 | 6000 | 8000 | 10 000

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DONA ANA COUNTY AREA, NEW MEXICO NO. 38

DONA ANA COUNTY AREA, NEW MEXICO — SHEET NUMBER 39

39

DONA ANA COUNTY AREA, NEW MEXICO NO. 39

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

300 000 FEET

560 000 FEET

T. 21 S. | T. 20 S.

(Joins sheet 35)

(Joins sheet 40)

(Joins sheet 38)

(Joins inset, sheet 7—1:24 000)

(Joins sheet 8—1:24 000)

JORNADA EXPERIMENTAL RANGE

EXPERIMENTAL RANGE BOUNDARY

APPROXIMATE BOUNDARY

DONA ANA MOUNTAINS

intermittent

WH BJ BO BP NU OP RG RL SH ST DR BK

R. 1 W. | R. 1 E.

R. 1 E. | R. 2 E.

(Joins sheet 43)

350 000 FEET

530 000 FEET

N

4 Miles

20 000 Feet

10 000

Scale 1:48 000

0 2 000 4 000 6 000 8 000 10 000

(40)

N

Scale 1:48 000

4 Miles 2 0

20 000 Feet 10 000 0

2 1 0 2

10 000 8 000 6 000 4 000 2 000 0

R. 2 E. | R. 3 E. | R. 3 E. | R. 4 E.

(Joins sheet 36)

410 000 FEET

560 000 FEET

T. 20 S. | T. 21 S.

(Joins sheet 39)

530 000 FEET

360 000 FEET

(Joins sheet 44)

(Joins sheet 41)

JORNADA EXPERIMENTAL RANGE BOUNDARY

APPROXIMATE BOUNDARY

SOIL SURVEY BOUNDARY OF MILITARY RESERVATION

UNITED STATES AIR FORCE

WHITE SANDS MISSILE RANGE

Loman Canyon

Little Tank

Clark and Brown Canyon

Isaak Lake

DR NU BJ OP BK ST RG AM

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture. Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DONA ANA COUNTY AREA, NEW MEXICO NO. 40

DONA ANA COUNTY AREA. NEW MEXICO — SHEET NUMBER 41

41

R. 5 W. | R. 4 W. | 180 000 FEET | R. 4 W. | R. 3 W. | (Joins sheet 37)

520 000 FEET

T. 22 S. | T. 21 S.

(Joins sheet 42)

T. 23 S. | T. 22 S.

490 000 FEET

230 000 FEET

(Joins sheet 46)

LUNA COUNTY

DONA ANA COUNTY

APACHE FLATS

Massacre Peak

Fort (ruins)

Chandler Tank

Draw

Mason

int

AL BJ BK Mo MN NL NU RG RT SH ST

N

4 Miles

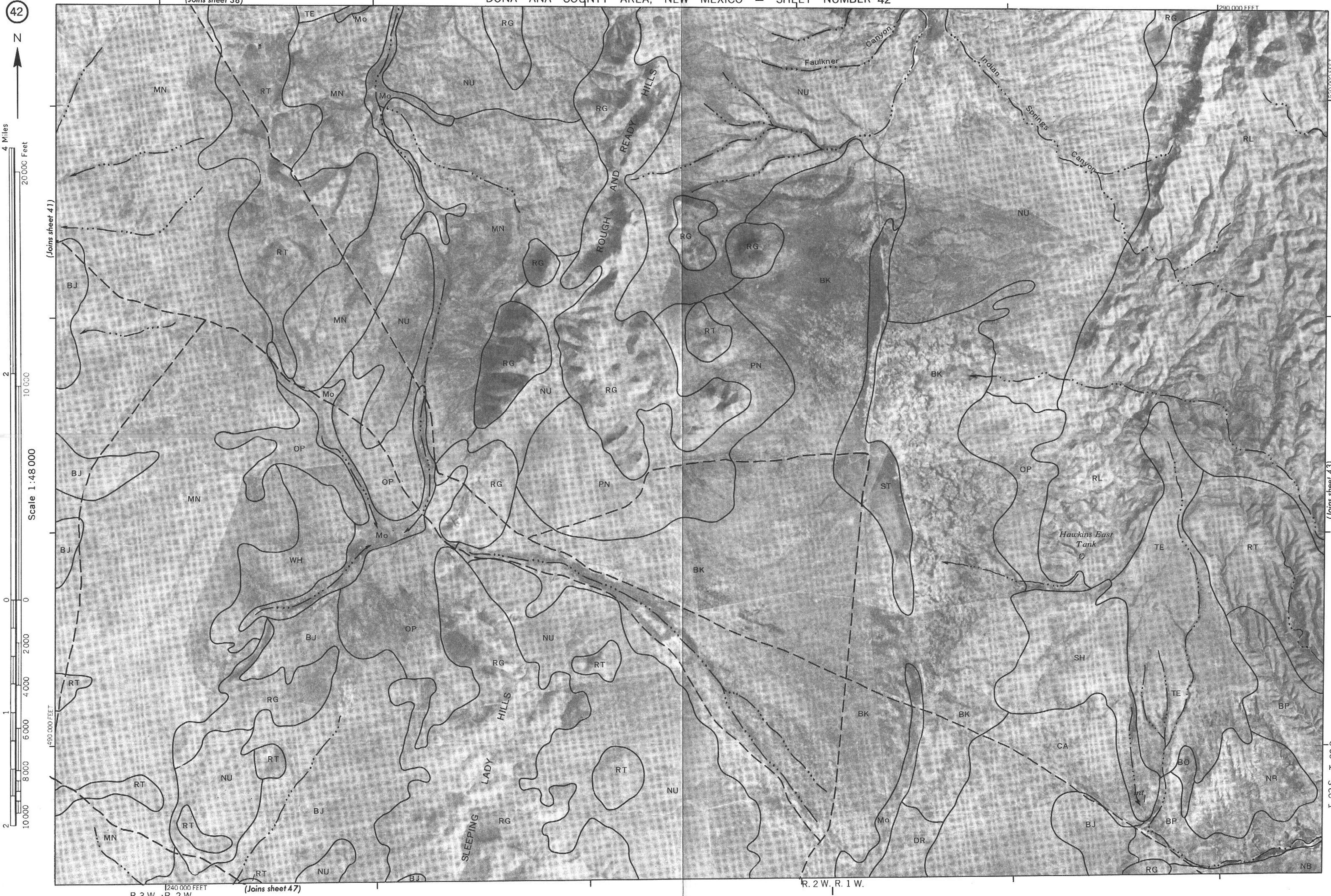
20000 Feet

Scale 1:48 000

DONA ANA COUNTY AREA, NEW MEXICO NO. 41

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DONA ANA COUNTY AREA, NEW MEXICO — SHEET NUMBER 42

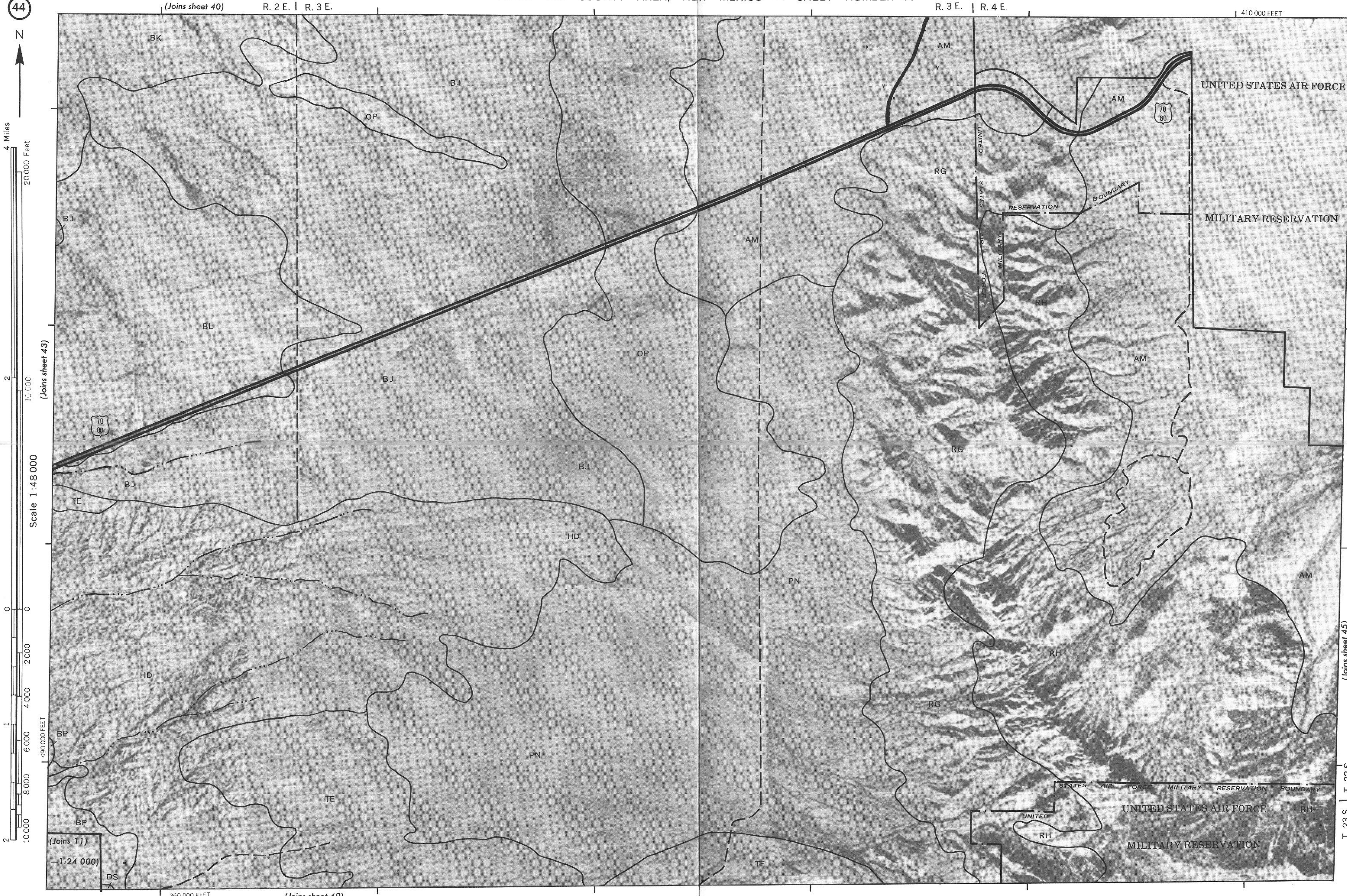


This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DONA ANA COUNTY AREA, NEW MEXICO NO. 42

DONA ANA COUNTY AREA, NEW MEXICO NO. 43

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned



This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land divisions corners, if shown, are approximately positioned.

DONA ANA COUNTY AREA, NEW MEXICO NO. 44

DONA ANA COUNTY AREA, NEW MEXICO — SHEET NUMBER 45

45

INSET A

R. 5 W. | R. 4 W. | 180 000 FEET

650 000 FEET

T. 17 S. | T. 18 S.

R. 4 W. | R. 3 W.

SIERRA COUNTY

BP NU RT BP RT NB Te RL

(Joins inset A, sheet 3 —1:24 000)

10 000 AND 4000-FOOT GRID TICKS

646 000 FEET

(Joins inset B)

(Joins sheet 29)

230 000 FEET

INSET B

R. 3 W. | R. 2 W.

240 000 FEET

650 000 FEET

T. 17 S. | T. 18 S.

(Joins inset A)

R. 2 W. | R. 1 W.

SIERRA COUNTY

RL Te int Te DR BK RT Mo Mo NU RT Mo BJ RT OP RT CH SH BJ Mo

10 000 AND 4000-FOOT GRID TICKS

646 000 FEET

(Joins sheet 28)

(Joins sheet 30)

290 000 FEET

420 000 FEET

R. 4 E. | R. 5 E.

R. 5 E. | R. 6 E.

500 000 FEET

T. 22 S. | T. 23 S.

(Joins sheet 44)

AM

SOIL SURVEY LIMIT

WHITE SANDS MISSILE RANGE

RH

PN

AM

BL

OTERO COUNTY

490 000 FEET

(Joins sheet 50)

470 000 FEET

N

4 Miles

20000 Feet

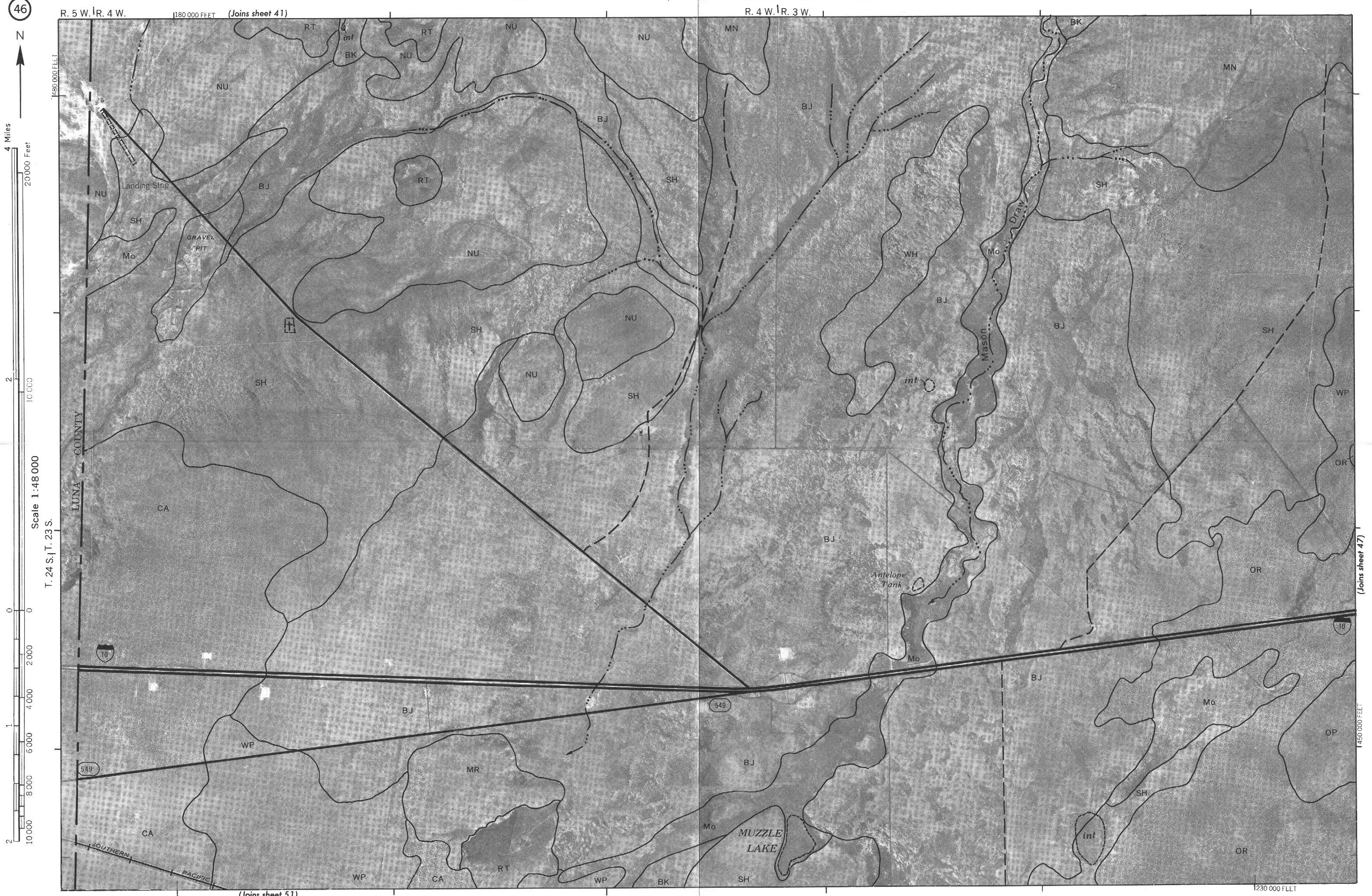
Scale 1:48 000

0 1 2

0 2 000 4 000 6 000 8 000 10 000

DONA ANA COUNTY AREA, NEW MEXICO NO. 45

This index is compiled from aerial photographs by the U.S. Department of Agriculture Soil Conservation Service and cooperating agencies.
Coordinate grid ticks are land survey corners. * shown are approximately positioned



This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DONA ANA COUNTY AREA, NEW MEXICO NO. 46

DONA ANA COUNTY AREA, NEW MEXICO — SHEET NUMBER 47

47

DONA ANA COUNTY AREA, NEW MEXICO NO. 47

This map is compiled on 1937 aerial photography by the U.S. Department of Agriculture Soil Conservation Service and cooperating agencies
Coordinate grid ticks and land division corners if shown are approximately positioned

(Joins sheet 42)

290 000 FEET

480 000 FEET

N

4 Miles

20000 Feet

(Joins sheet 48)

SLEEPING LADY HILLS

Reichey Butte

Los Coralitos

Landing Strip

Las Cruces Airport

Bn

(Joins sheet 46)

T. 24 S.

T. 23 S.

450 000 FEET

240 000 FEET

R. 3 W.

R. 2 W.

R. 1 W.

(Joins sheet 52)

Scale 1:48 000

0 2 000 4 000 6 000 8 000 10 000

DONA ANA COUNTY AREA, NEW MEXICO — SHEET NUMBER 48

48

N

Scale 1:48 000

4 Miles 2 0

20 000 Feet 10 000 0

1 2 0 2 000 4 000 6 000 8 000 10 000

R. 1 W. | R. 1 E. | R. 1 E. | R. 2 E.

350 000 FEET

480 000 FEET

450 000 FEET

300 000 FEET

T. 24 S. | T. 23 S.

(Joins sheet 43)

(Joins sheet 47)

(Joins sheet 12 — 1:24 000)

(Joins sheet 14 — 1:24 000)

(Joins sheet 49)

(Joins sheet 53)

NB RT TE BP BO Bn CA OP WP WH SH

70 80 10

This map is compiled on 1974 aerial photography by the U.S. Department of Agriculture Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately plotted

DONA ANA COUNTY AREA, NEW MEXICO NO. 48

DONA ANA COUNTY AREA, NEW MEXICO NO. 49

This map is compiled on 1951 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

R. 2 E. | R. 3 E.

360 000 FEET

480 000 FEET

(Joins sheet 44)

(Joins inset, sheet 10 — 1:24 000)

(Joins sheet 48) — 1:24 000

(Joins sheet 50)

(Joins sheet 54)

R. 3 E. R. 4 E.

410 000 FEET

450 000 FEET

T. 24 S. | T. 23 S.

N

4 Miles

20000 Feet

Scale 1:48 000

APPROXIMATE BOUNDARY

DOÑA ANA BEND COLONY GRANT

BRAZITO GRANT

UNITED STATES AIR FORCE MILITARY RESERVATION BOUNDARY

FORT BLISS TARGET RANGE BOUNDARY

FORT BLISS

TARGET RANGE

UNITED STATES AIR FORCE MILITARY RESERVATION

Soledad Canyon

Canyon

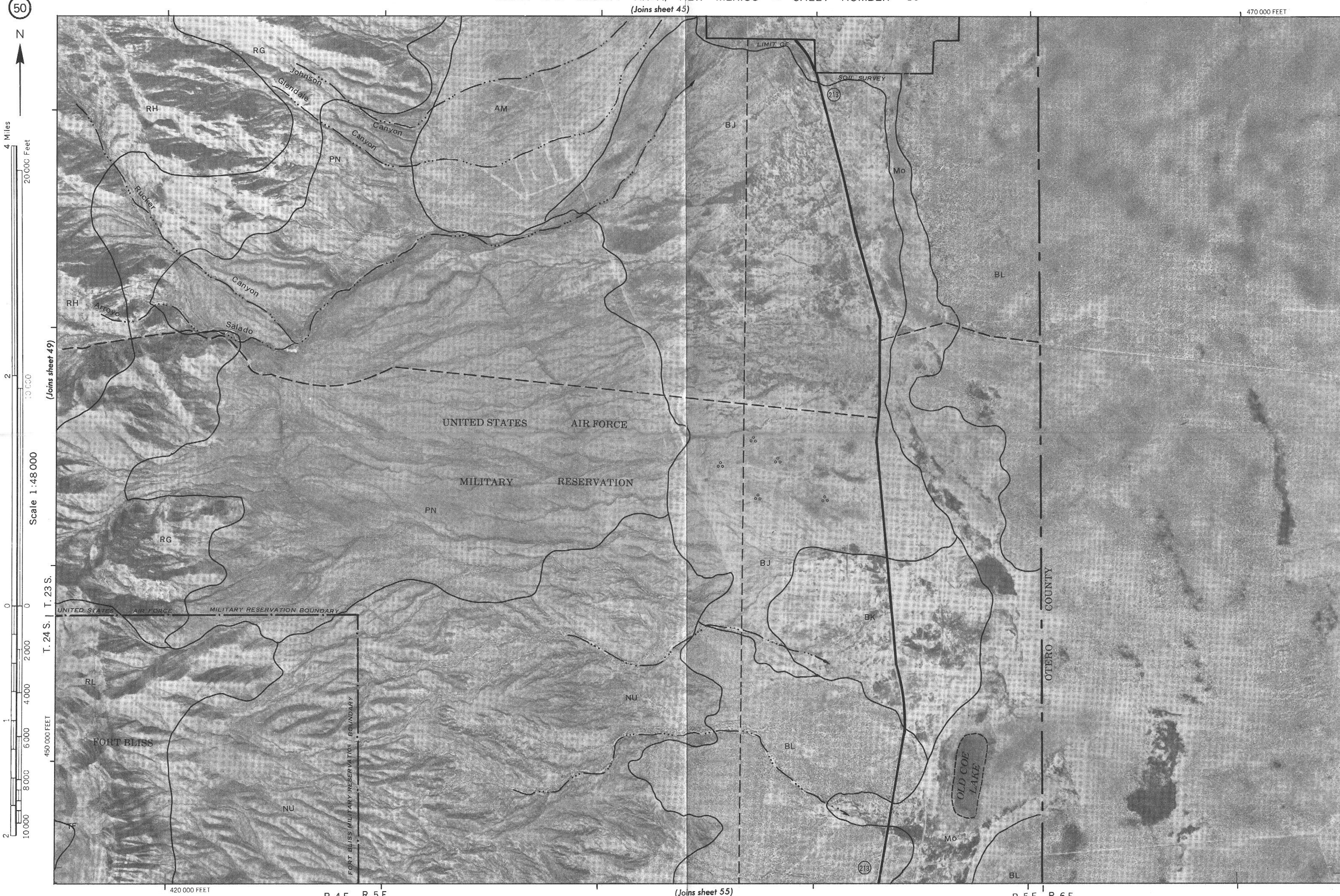
Long Canyon

Boulder Canyon

Achenback Canyon

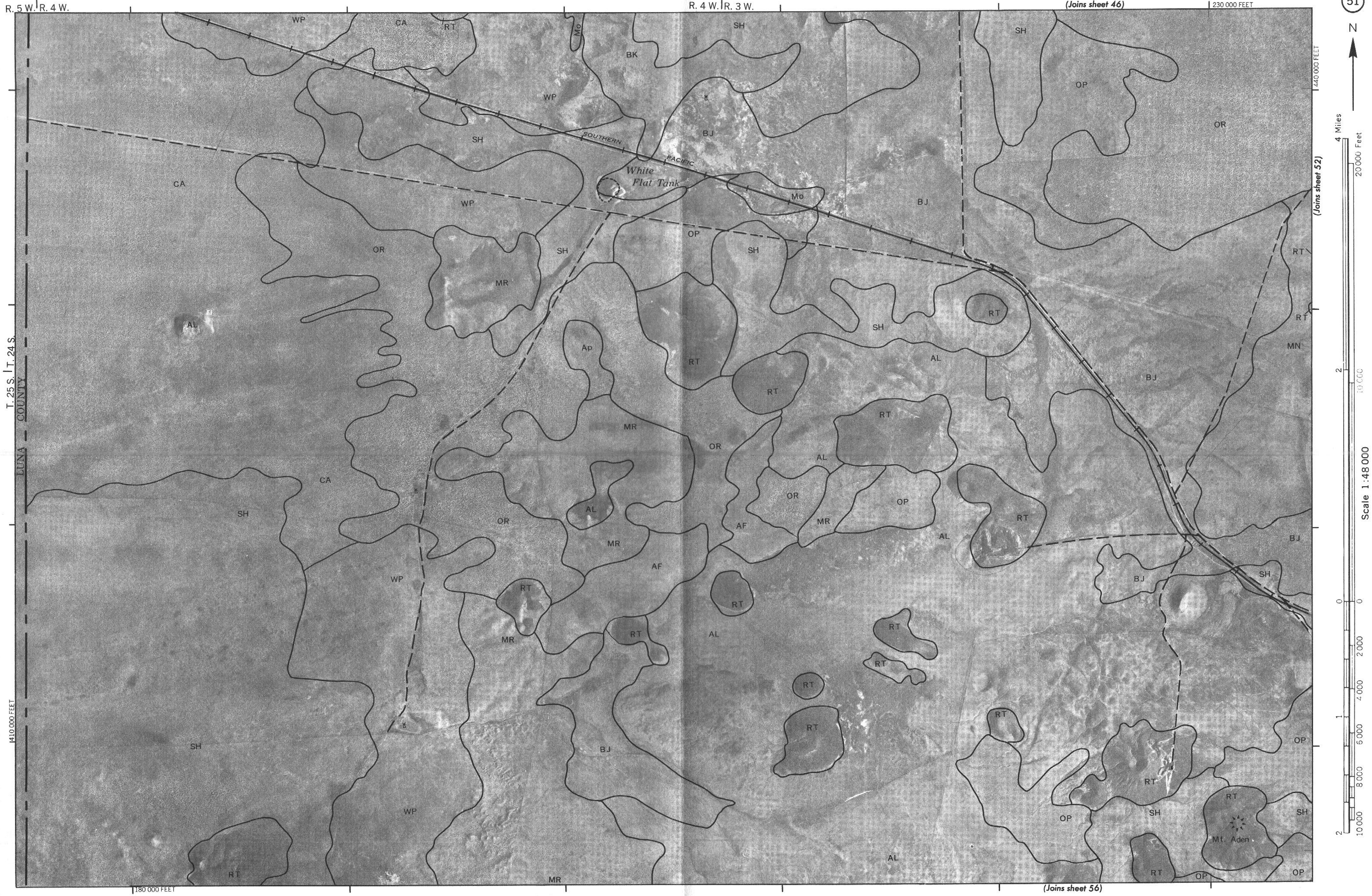
int

DS HD BP TE TF PN RG RH Cb RL BO OP

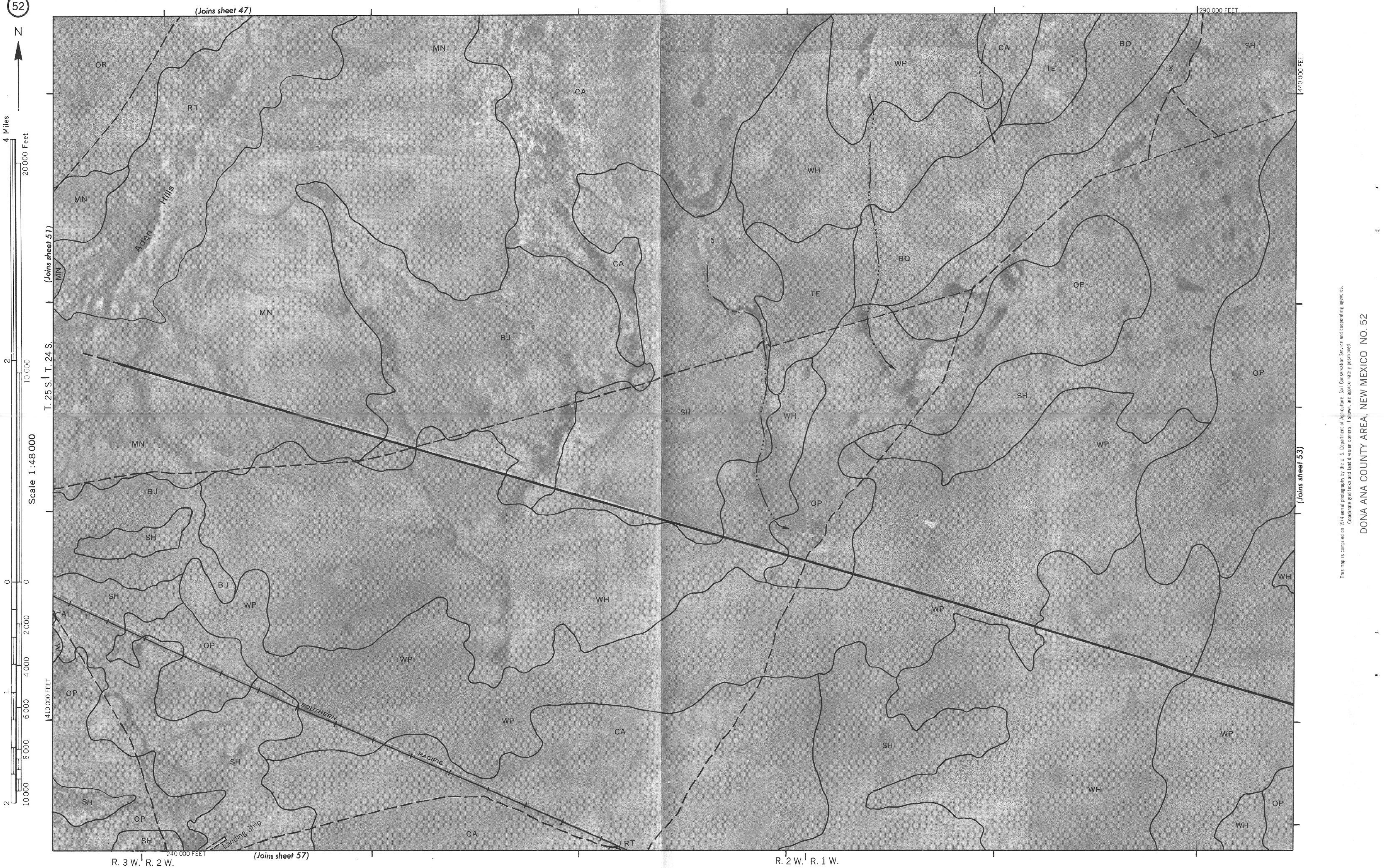


This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DONA ANA COUNTY AREA, NEW MEXICO NO. 50



DONA ANA COUNTY AREA, NEW MEXICO NO. 51
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.


52
N
(Joins sheet 47)
(Joins sheet 51)
(Joins sheet 53)
(Joins sheet 57)
Scale 1:48 000
4 Miles
20 000 Feet
T. 25 S. T. 24 S.
R. 3 W. R. 2 W.
R. 2 W. R. 1 W.
290 000 FEET
440 000 FEET
410 000 FEET
240 000 FEET
Aden Hills
SOUTHERN PACIFIC
Landing Strip
OR
RT
MN
CA
BJ
SH
WP
OP
AL
WH
TE
BO
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.
DONA ANA COUNTY AREA, NEW MEXICO NO. 52

DONA ANA COUNTY AREA, NEW MEXICO — SHEET NUMBER 53

53

DONA ANA COUNTY AREA, NEW MEXICO NO. 53

This map is compiled on 1937 aerial photography by the U. S. Department of Agriculture. Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

300 000 FEET

440 000 FEET

(Joins sheet 48)

SANTO TOMAS Y YURBIDE COLONY GRANT BOUNDARY

SANTO TOMAS DE YTURBIDE COLONY GRANT

APPROXIMATE BOUNDARY

(Joins sheet 54)

(Joins sheet 52)

(Joins sheet 58)

(Joins sheet 16 — 1:24 000)

(Joins sheet 18 — 1:24 000)

T. 25 S. I T. 24 S.

R. 1 W. R. 1 E.

R. 1 E. I R. 2 E.

410 000 FEET

350 000 FEET

SH OP WP WH BP TE AL BO RF

N

4 Miles

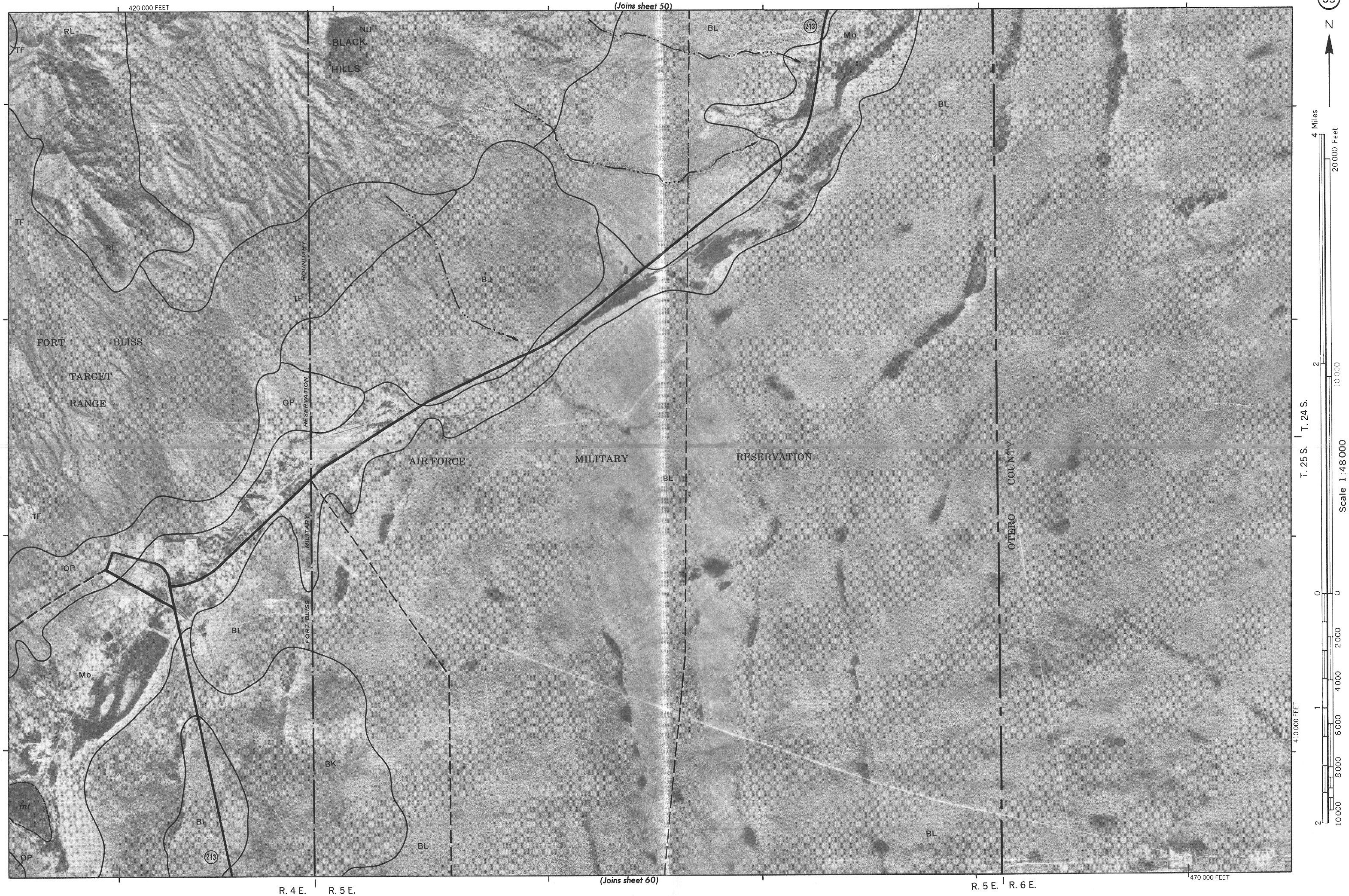
20000 Feet

Scale 1:48 000

DONA ANA COUNTY AREA, NEW MEXICO — SHEET NUMBER 54

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DONA ANA COUNTY AREA, NEW MEXICO NO. 54



DONA ANA COUNTY AREA, NEW MEXICO NO. 55

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DONA ANA COUNTY AREA, NEW MEXICO — SHEET NUMBER 56

56

N

4 Miles 20000 Feet

2 10 000

Scale 1:48 000

0 1 2 000 4 000 6 000 8 000 10 000

370 000 FEET

180 000 FEET

230 000 FEET

400 000 FEET

T. 26 S. | T. 25 S.

R. 5 W. | R. 4 W.

R. 4 W. | R. 3 W.

(Joins sheet 51)

(Joins sheet 57)

(Joins sheet 61)

COUNTY

LUNA

MOUNTAINS

POTRILLO

WEST

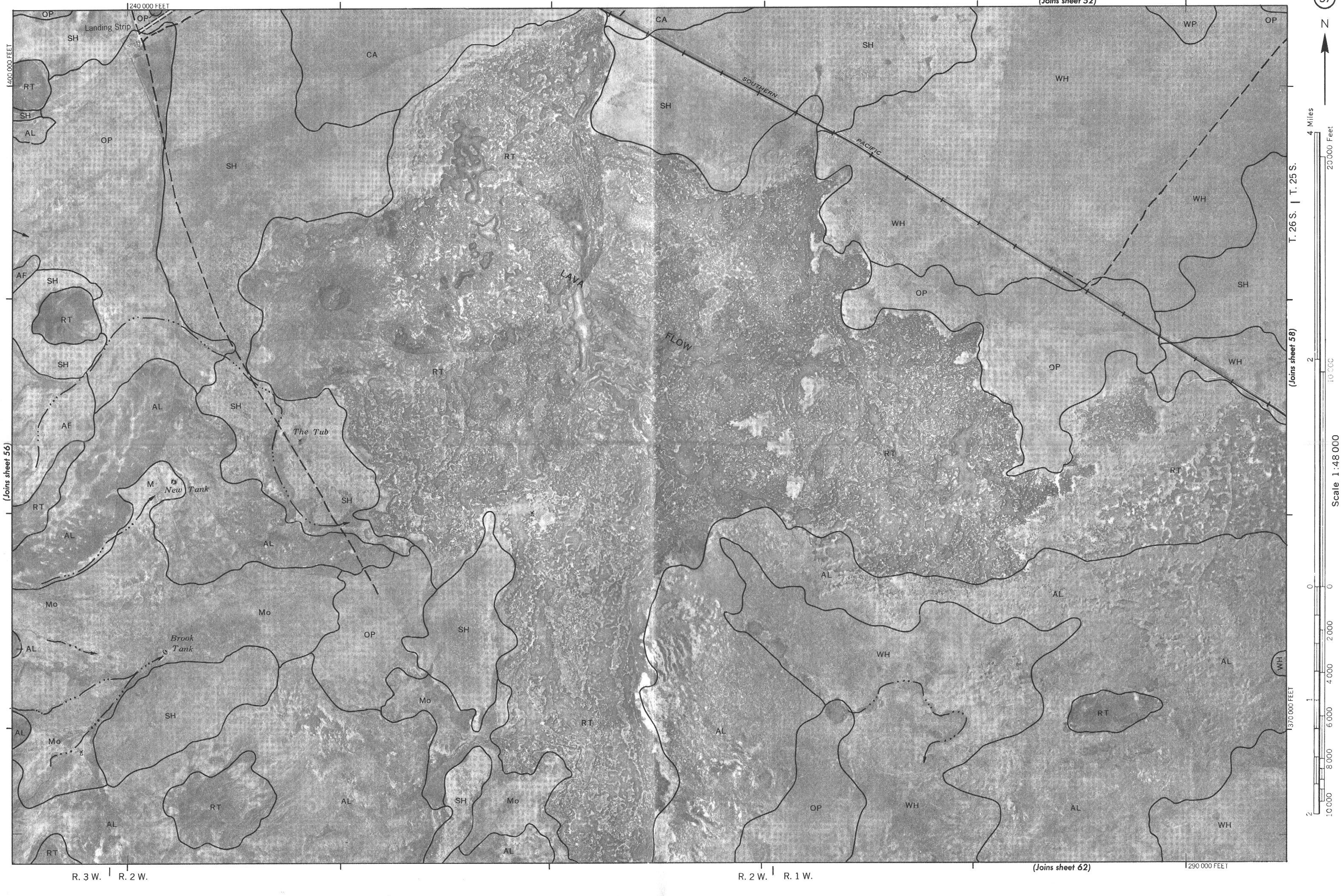
Aden

West Tub

RT SH WP MR BL AL AF ST OP Mo

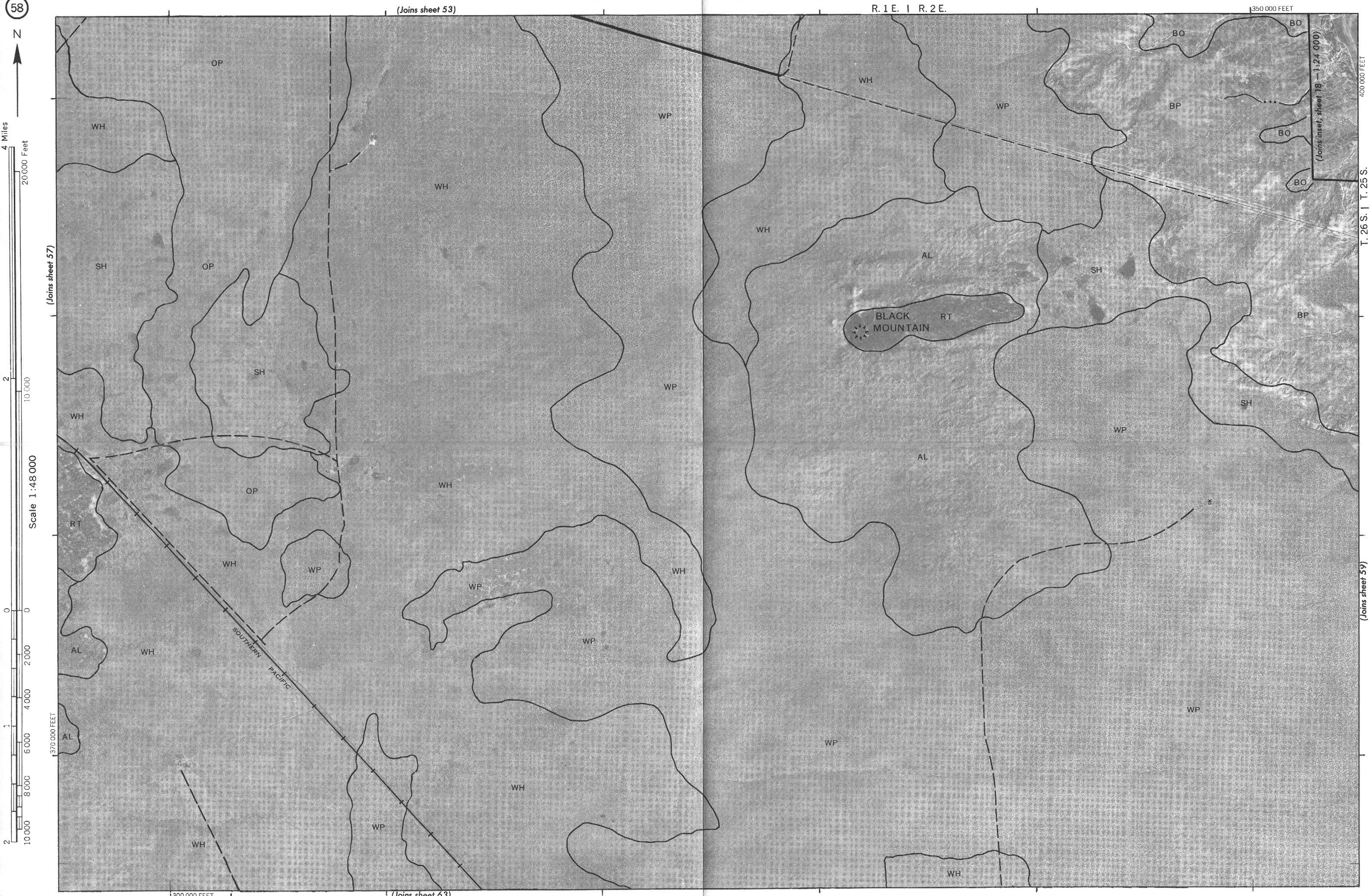
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land survey corners, if shown, are approximately positioned.

DONA ANA COUNTY AREA, NEW MEXICO NO. 56



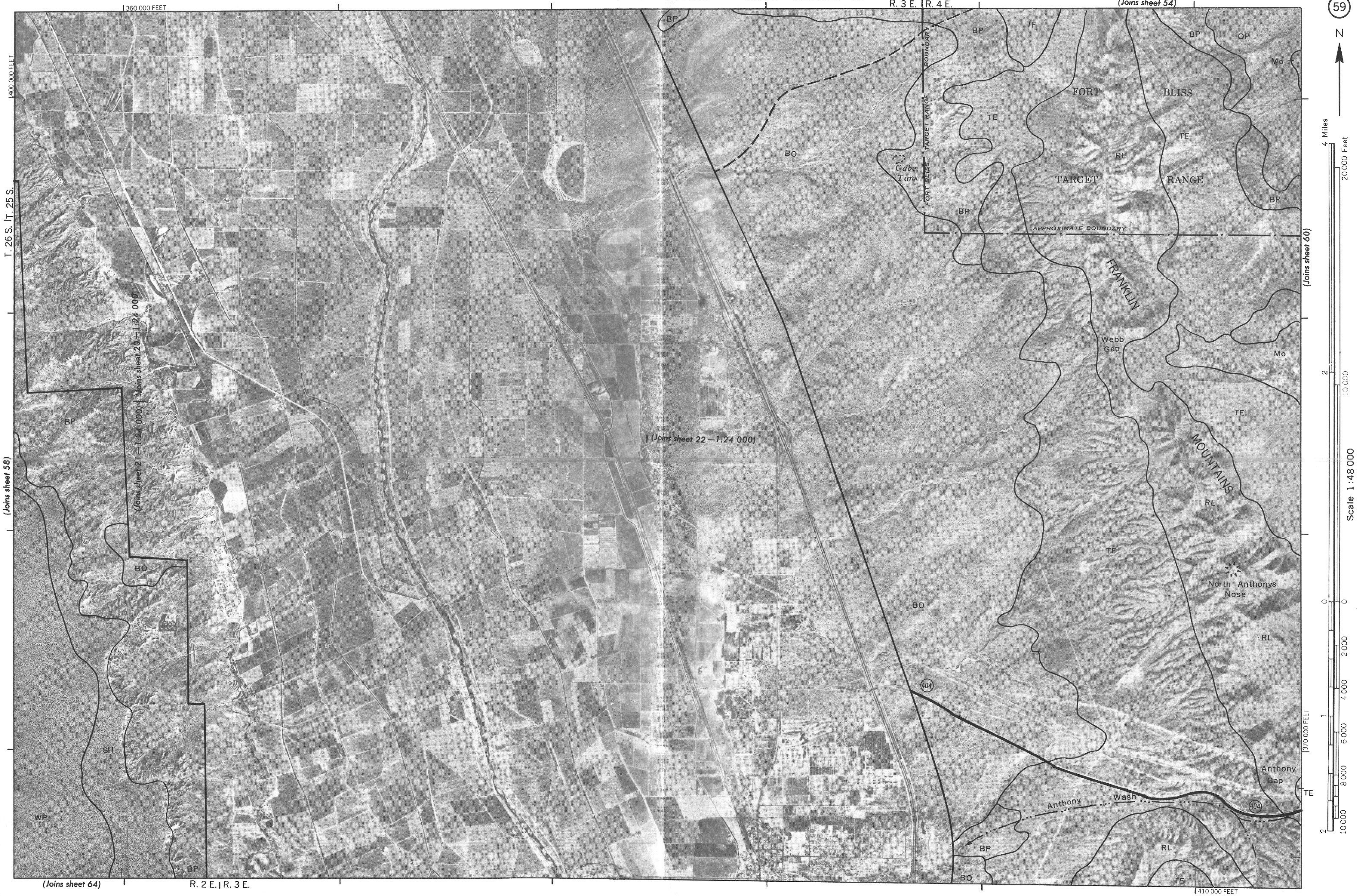
DONA ANA COUNTY AREA, NEW MEXICO NO. 57

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DONA ANA COUNTY AREA, NEW MEXICO NO. 58



DONA ANA COUNTY AREA, NEW MEXICO NO. 59

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DONA ANA COUNTY AREA, NEW MEXICO — SHEET NUMBER 60

60

N

R. 4 E. | R. 5 E.

(Joins sheet 55)

470 000 FEET

400 000 FEET

T. 26 S. | T. 25 S.

(Joins sheet 59)

UNITED STATES AIR FORCE MILITARY RESERVATION

FORT BLISS TARGET RANGE

FORT BLISS TARGET RANGE BOUNDARY

APPROXIMATE BOUNDARY

UNITED STATES AIR FORCE MILITARY RESERVATION BOUNDARY

Chaparral

FRANKLIN MOUNTAINS

OTERO COUNTY

EL PASO COUNTY

420 000 FEET

370 000 FEET

R. 5 E. | R. 6 E.

Scale 1:48 000

4 Miles 2 0

20 000 Feet 10 000 0

2 000 4 000 6 000 8 000 10 000

1 0

2

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown are approximately positioned.

DONA ANA COUNTY AREA, NEW MEXICO NO. 60

DONA ANA COUNTY AREA, NEW MEXICO NO. 61

This map is compiled on 1937 aerial photography by the U. S. Department of Agriculture Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

180 000 FEET

360 000 FEET

(Joins sheet 56)

(Joins sheet 62)

330 000 FEET

230 000 FEET

(Joins sheet 65)

LUNA COUNTY

DONA ANA COUNTY

POTRILLO MOUNTAINS

WEST

R.5 W. | R. 4 W.

R. 4 W. | R. 3 W.

T. 28 S. | T. 27 S.

61

N

Scale 1:48 000

4 Miles

20000 Feet

(Joins sheet 57)

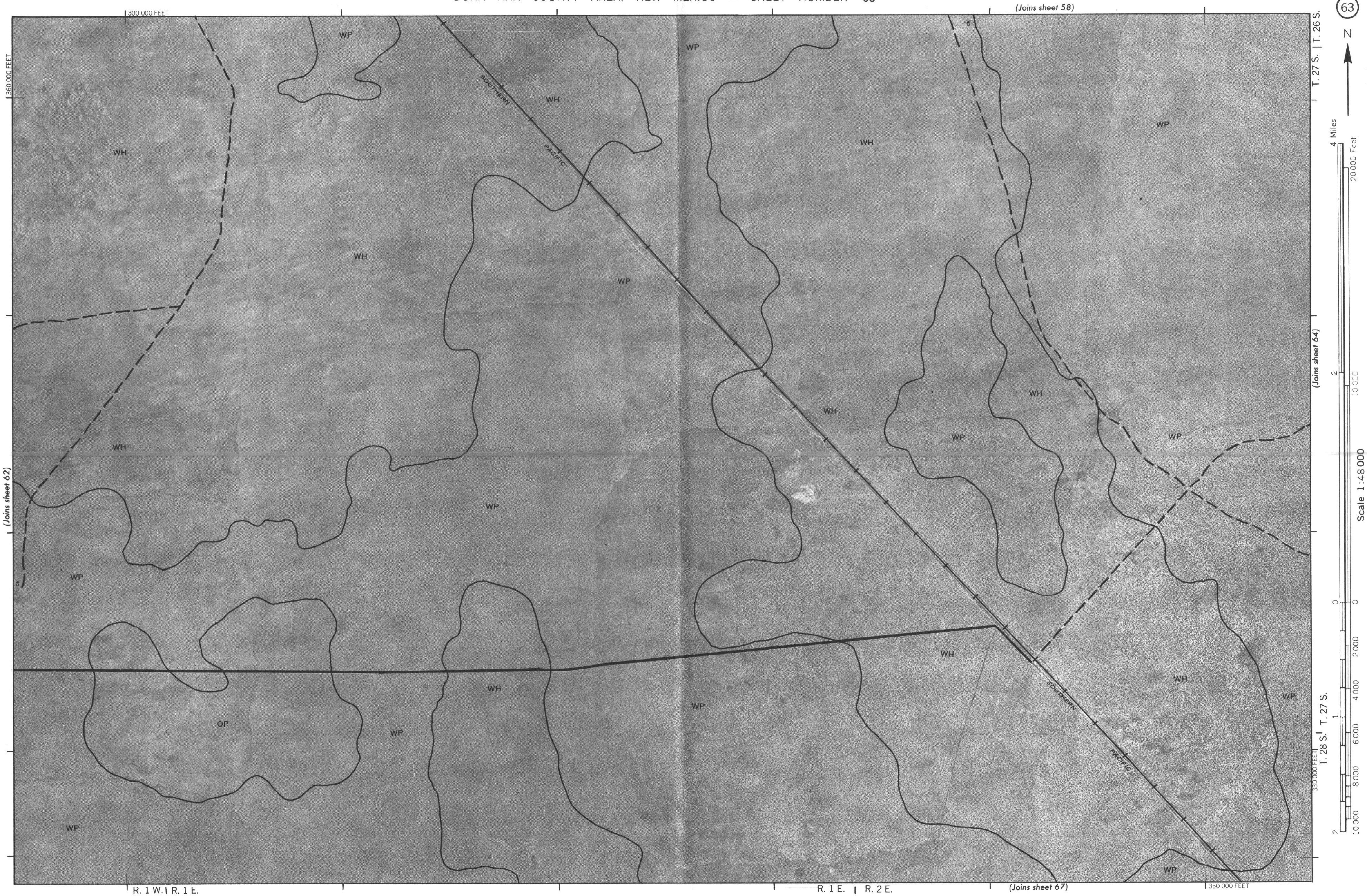
(Joins sheet 66)

R. 3 W. R. 2 W.

R. 2 W. R. 1 W.

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DONA ANA COUNTY AREA, NEW MEXICO NO. 62



DONA ANA COUNTY AREA, NEW MEXICO NO. 63

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

64

N

Scale 1:48 000

4 Miles
2
1
0
1
2

20 000 Feet
10 000
0
2000
4000
6000
8000
10 000

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DONA ANA COUNTY AREA, NEW MEXICO NO. 64

DONA ANA COUNTY AREA, NEW MEXICO — SHEET NUMBER 65

65

R. 5 W. | R. 4 W. | R. 4 W. | R. 3 W.

180 000 FEET

320 000 FEET

(Joins sheet 61)

(Joins sheet 66)

N

4 Miles

20000 Feet

T. 29 S. T. 28 S.

Scale 1:48 000

230 000 FEET

230 000 FEET

LUNA COUNTY

MOUNTAINS

POTRILLO

WEST

Guzmans Lookout Mountain

CHIHUAHUA REPUBLIC OF MEXICO

BL AL AF RT OP WP SH MR Mo

DONA ANA COUNTY AREA, NEW MEXICO NO. 65

This map is compiled on 1972 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners shown are approximately positioned.

DONA ANA COUNTY AREA, NEW MEXICO — SHEET NUMBER 66

66

N

Scale 1:48 000

4 Miles 2 0

20 000 Feet 10 000 0

T. 29 S. | T. 28 S.

(Joins sneet 62)

(Joins sheet 65)

(Joins sheet 67)

290 000 FEET

320 000 FEET

240 000 FEET

R. 3 W. | R. 2 W. | R. 2 W. | R. 1 W.

EAST POTRILLO MOUNTAINS

CHIHUAHUA REPUBLIC OF MEXICO

AL SH RT WP OP AF TE NU RL BK Mo WH

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and grid divis or corners, if shown, are approximately positionec.

DONA ANA COUNTY AREA, NEW MEXICO NO. 66

DONA ANA COUNTY AREA, NEW MEXICO — SHEET NUMBER 67

R. 1 W. | R. 1 E. | R. 2 E.

300 000 FEET

320 000 FEET

T. 29 S. | T. 28 S.

(Joins sheet 66)

(Joins sheet 63)

(Joins sheet 68)

290 000 FEET

350 000 FEET

SOUTHERN PACIFIC

WP

WH

SH

Pb

CHIHUAHUA

REPUBLIC OF MEXICO

67

N

4 Miles

20000 Feet

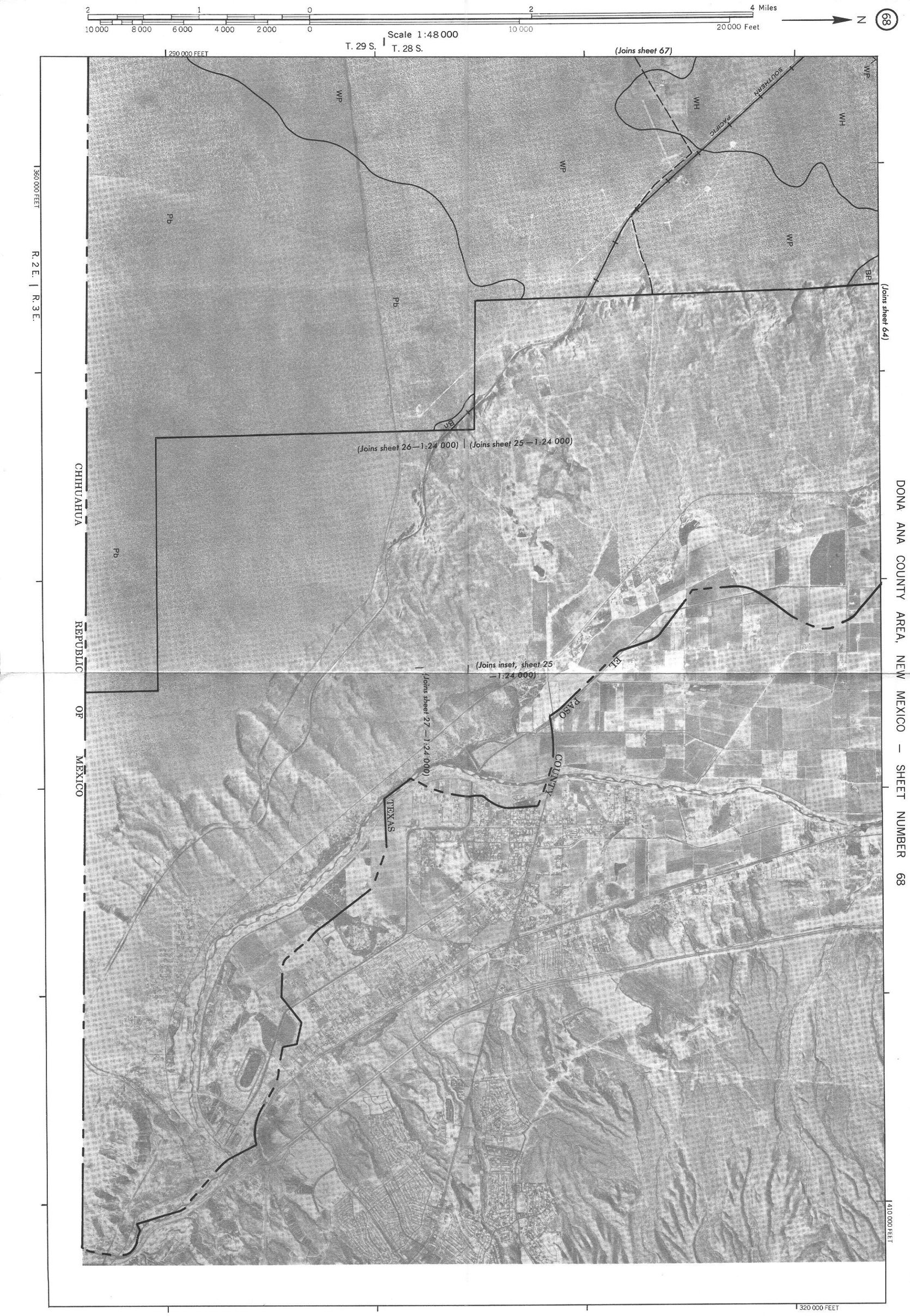
10000

Scale 1:48 000

0 1 2 0 2 000 4 000 6 000 8 000 10 000

DONA ANA COUNTY AREA, NEW MEXICO NO. 67

This map is compiled on 1974 aerial photographs by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land lines on corners, if shown, are approximately positioned.



This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

DONA ANA COUNTY AREA, NEW MEXICO NO. 68